UNIVERSITAT DE BARCELONA

Benchmarking of local e-government services and its applicability to smart city services

Joan Batlle i Montserrat

Universitat de Barcelona

Departament de Biblioteconomia i Documentació

Doctorat en Informació i Documentació en la Societat del Coneixement

Benchmarking of local e-government services and its applicability to smart city services

Tesi doctoral que presenta **Joan Batlle i Montserrat** per optar al títol de doctor per la Universitat de Barcelona

Directors: **Dr. Ernest Abadal i Falgueras** (UB) i
Dr. Josep Blat i Gimeno (UPF)

Barcelona, 29 d'agost de 2015

UNIVERSITAT DE BARCELONA

Table of content

Abstract

The aim of this PhD thesis is to contribute to a better knowledge of the local e-government phenomena by designing and implementing a benchmarking methodology. The methodology proposed is oriented to perform local e-government benchmarking at international level, based on the e-services provided by local administrations. It promotes the learning aspects of a comparative evaluation instead of the competition among participant cities. After a detailed review of the state of the art in local e-Government benchmarking, the research deals with a bottom-up process to define the benchmarking methodology which groups meaningfully services taking into account prevalence. Special attention has been paid to the adoption measurement, as it is crucial to evaluate the actual impact of electronic public services. This methodology is applied in a European measurement, and the results are discussed. The impact of such benchmarking is assessed four years afterwards by means of a survey. The feedback received confirms the utility of such benchmarking, at the same time, it provides information for improvements of the methodology and shows the need to update the catalogue of services. Finally, the research explores the extensions required to allow benchmarking the new generation of smart city services, thus paving the way for its applicability in a Smart City context.

Resum

L'objectiu d'aquesta tesi és el de contribuir al millor coneixement del govern electronic a les ciutats a través del disseny i implementació d'una metodologia d'avaluació comparativa. Una metodologia per dur a terme benchmarking del e-govern local en l'àmbit internacional basant-se en la comparació de serveis proporcionats per les administracions locals. Una metodologia que promou l'aprenentatge i no la competició entre les ciutats participants. Després d'una revisió detallada de l'estat de la qüestió de l'avaluació comparativa del govern electrònic local, s'exposa el procés seguit per definir la metodologia d'avaluació comparativa que agrupa de manera significativa els serveis tenint en compte la seva prevalença. S'ha prestat especial atenció al mesurament de l'adopció, ja que és fonamental per avaluar l'impacte dels serveis públics electrònics. La metodologia s'aplica en una mesura Europea, els resultats de la qual es presenten i discuteixen. Quatre anys després es mesura l'impacte d'aquest benchmarking. Les respostes obtingudes confirmen la validesa de la metodologia. A la vegada, es proposen millores a la metodologia i posa de manifest la necessitat d'actualitzar el catàleg de serveis. Finalment, la investigació explora l'extensió de la nova metodologia per tal d'avaluar també els serveis que es poden trobar en una Smart City a aplanant així el camí per a l'aplicació de la metodologia en aquest nou escenari.

Resumen

El objetivo de esta tesis doctoral es el de contribuir a un mejor conocimiento de los fenómenos del e-gobierno local mediante el diseño e implementación de una metodología de evaluación comparativa. Es una metodología para la evaluación comparativa del e-gobierno local a nivel internacional sobre la base de los servicios electrónicos prestados. Esta metodología promueve los aspectos del aprendizaje de una evaluación comparativa en

lugar de la competencia entre las ciudades participantes. Después de una revisión detallada del estado del arte en la evaluación comparativa del e-gobierno local, la investigación aborda un proceso de abajo hacia arriba para definir la metodología de la evaluación comparativa que agrupa los servicios de acuerdo con su popularidad. Se ha prestado especial atención a la medición de la adopción, ya que es fundamental para evaluar el impacto de los servicios públicos electrónicos. Esta metodología se aplica en una medida europea, y se discuten los resultados. El impacto de tal evaluación comparativa se evalúa cuatro años después por medio de una encuesta. La información recibida confirma la utilidad de dicha metodología, al mismo tiempo, proporciona información para un mayor refinamiento y muestra la necesidad de actualizar el catálogo de servicios. Por último, la investigación explora la extensión de la nueva metodología a fin de evaluar también la nueva generación de servicios presentes en las Smart City allanando así el camino para su aplicabilidad en este nuevo contexto.

Acknowledgements

First of all, I am truly grateful to my PhD dissertation advisor Professor Dr. Ernest Abadal for his invaluable advice, his professionalism, strong intellect and clear vision which were key to keeping my research focused over the years. And my special appreciation and thanks to Dr. Josep Blat. It has been an honour and a privilege to be his PhD student. I appreciate all the time he devoted to hearing my arguments and ideas. But also, I am thankful for all his ideas, contributions and suggestions that made my PhD experience so productive and stimulating. As a professor and researcher, he has been an excellent example of patience, rigour, constancy and dedication.

Many thanks to all the members of the EUROCITIES work group: Paul Van der Cruyssen, Paul Tondeleir, Hans Beyers, Linda Syrstad, Maj-Britt Brobakke, Lars Tveit, Marcos Muro, Blanca Herrán, Ainhoa Franco, Chris Price, Claire Davis, Giuseppe Paruolo, Leda Guidi, Luca Zanelli, Daniele Tarozzi, André de Rosa Spierings, Ron van der Kolk, Tuomo Karakorpi, Kari Miskala, Maura Gambarana, Antonella Longo, Alessandro Musumeci, Stefano Bartolotta, Rosa Martínez, José Martínez, Vlado Kon, Tatjana Perše, Väinö Olev, Kai Kotka, Katrin Savomägi, Marten Buschman, Franco Carcillo, Ingrid Götzl and Sonja Sattelberger. Without their contribution and support it would have been impossible to launch the pilot survey and further evaluate its impact.

I am very grateful to Dr. Mila Gascó for the academic advice in the first pilot design, and also to Raquel Calderón for her collaboration in the development of the first pilot. Without her contribution and work it would have been difficult to coordinate and integrate the work of the 15 participating cities and prepare the final EUROCITIES report.

I am also indebted to all my colleagues, collaborators and trainees who worked with me over the years in the International Relations Department of the Municipal Institute of Informatics. With special gratitude to Lucia Garutti, Irma Merino, David Pascual, Sergi de la Viuda, Julia López and Carlos Paternain. And a special mention to David Esteban, not only for his enthusiastic, rigorous and tireless work in the European Study of E-government City Models, but also for his professionalism and high standards, which I'm proud to take as a reference.

I would like to acknowledge the CIOs of Barcelona City Council, Jose Ramon Rodriguez and Pilar Conesa, and the Director of the Municipal Institute of Informatics, Lluis Olivella. Without their trust and support, it would have been impossible to develop all the initial projects that ultimately inspired me to pursue this PhD.

My special thanks to Dr. Jungwoo Lee, Director of the Center for Work Science (CWS) in Yonsei University, Seoul (Korea); Prof. Frank Bannister of Trinity College, Dublin, founder and chief editor of the Electronic Journal of e-Government; and Graham Colclough, Capgemini Vice President of Global Public Sector and coordinator of the

Capgemini e-Government Benchmarks for the European Commission, for the interest shown in my research and for the time spent discussing and commenting it.

I also would like to thank all those anonymous reviewers of the published papers whose comments contributed to substantially improving the quality of this research.

Last but not least, I would like to express my deepest gratitude to my family, especially my daughter Sabina to whom I wish a successful career as a researcher, and to all my friends for their patience, interest, encouragement and help.

1. Introduction

1.1 Motivation

E-government is generally described as the use of information and communication technologies (ICT) in government processes. The potential of ICT to transform governmental organizations into more efficient, accessible and accountable ones is widely recognized. Taking into account that according to EUROSTAT, the total EU28 public sector expenditure in 2014 represented 48.1% of its GDP, and that this percentage was 49.0% for the EA-19, the economic impact of such a transformation is of capital importance for economic growth.

Nowadays, all national governments, nearly all subnational governments, and most local governments of any size are adopting and expanding innovative means of delivering government information and service by means of a quick technology adoption process (Norris & Reddick 2013). This is a transformation characterized by intensive ICT use and adoption of new organizational paradigms. But in addition to changes in internal processes, e-government impacts the relationship with citizens, which is shifting towards "one-stop-shops" supported by a more intelligent organization able to know who the citizen is and what the citizen's needs are in each case. In other words, public organizations are reforming themselves to be more proactive and provide services to citizens more efficiently.

Putting the focus at local level public government agencies, it can be seen that cities and municipalities develop an important number of functions related to urban management such as traffic, public transport, the environment, cleaning, garbage collection, street lighting, culture, education, welfare, crime control and civil protection among others. In some countries, cities are also responsible for providing basic services such as water, gas and electricity. All these specific functions are not found at other levels of government and therefore introduce special features to local e-government.

At present, the way cities are managed and developed is starting to transform dramatically thanks to the intensive application of ICT, leading to what is known as the smart city phenomenon. New developments and technologies, derived from the introduction of sensor elements and the collection and processing of large amounts of data, are improving or even "reinventing" functions directly related to the provision and management of urban services. At the same time, this transformation aims to reduce the environmental impact of city activities.

Measuring e-government progress is of capital importance to manage public resources, shorter the transition to achieve a successful end. However, a review of the most recent papers published reveals a lack of academic literature and scientific reports devoted to the evaluation of e-administration at city level. There are no methodologies to perform

international benchmarking of e-administration tailored to local government specificities. There are no common references established to compare the quality of public services in different cities. Therefore, it remains hard to learn from others' experiences around the world.

I started my work in e-government in 1987 when I was hired by the Municipal Institute of Informatics (IMI) of Barcelona City Council. Currently, I still work there. Over these years, I have been working on local e-government strategy and management, internet provision of public services, adoption of e-government services, smart city strategy and urban innovation.

I spent the first 13 years using ICT to improve or transform public services, or even generate new public services delivered by electronic means. During that period, one research priority was to build tools to better manage the e-government transition in the city.

For the past 15 years, I have been in charge of the Department of International Relations on e-government. In that position, I have been collaborating with other cities, universities and companies around the world to develop projects, participate in think-tanks, surveys, comparative evaluations and work-groups. These collaborations have been done through different international organisations and networks of cities and international projects. In addition, I represented the City Council in an important number of international forums related with e-government. During that time, I had the opportunity to talk with widely recognized experts and academics in this field. That allowed me to gain important international experience and contacts in e-government.

Because of my scientific background in physics, I have always been concerned about giving my work as much scientific rigour as possible, as well as publishing the results to make them available to the community. Thanks to this approach, I started the PhD research already having a small corpus of published papers. I used some of them to enrich the discussion of the current research.

Barcelona City Council has a long tradition of international collaboration. This collaboration is mostly through international city networks, such as United Cities and Local Governments, Metropolis, EUROCITIES, Major Cities of Europe and World e-Government Organizations. Particularly in EUROCITIES, Barcelona representatives have always played an active role proposing topics, leading discussions, and chairing work-groups.

In mid-2006, the Barcelona team launched a survey among the members of EUROCITIES Knowledge Society Forum. It took place just after the release of the European Charter of e-Citizens Rights, developed in a work-group chaired by Barcelona. The survey aimed to understand the priorities of city managers so as to better focus the network's future work. It

turned out that city representatives were interested first in having more indicators and information to manage e-government deployment, and second in comparing their cities with other similar cities.

The first activity the Barcelona team undertook, based on the survey results, was to identify the key elements of successful or quite successful e-government deployments in Europe. The team did a case study of over 7 major European cities (Rodriguez, Batlle, & Esteban, 2007a) in the second half of 2006 and first months of 2007 and presented it at the EUROCITIES Knowledge Society Forum conference held in Barcelona in April 2007. A paper about the findings of that study is used in this PhD thesis to better ground the comparative evaluation of cities at the international level.

The second activity undertaken by the Barcelona team was aimed at establishing a comparative evaluation of e-government deployments.

In the second half of 2007, after the case study had been presented, a work-group was created in the EUROCITIES network to design a benchmarking methodology for public services provided by electronic means, a methodology that could offer city managers useful information.

At the inception of this activity, work-group members performed a bottom-up process to understand what city managers needed from benchmarking surveys, the limitations of existing benchmarking methodologies and the practical difficulties when applying them at city level. That allowed the work-group to identify the key traits a city's benchmarking should include to add real value to e-government management at the local level. The next step was the design of the benchmarking methodology.

Finally, a pilot measurement at European level was launched and its results reported and presented at a plenary session, grabbing the attention of Network members. Nevertheless, the design of the methodology, the pilot measurement, and presentation of the results were carried out without a rigorous grounding in current state-of-the-art e-government comparative evaluation. In addition, no assessment of the impact of such benchmarking was made.

This PhD thesis comes some years after to frame the methodology within the current state of the art. Moreover, the methodology and results of the first pilot benchmarking study, involving 15 diverse European cities, are analysed and discussed in depth. The thesis assesses the impact and discusses needed improvements in order to update the methodology and make it more useful to city managers. In addition, it analyses the current landscape of electronic services in cities and discusses how this methodology could contribute to building a benchmarking methodology for "smart" services.

Purpose and specific objectives

The main purpose of this PhD thesis is to contribute to e-government benchmarking of public services by defining a specific methodology that can be used to develop comparative evaluations at the international level. In addition, the thesis will analyse the methodology's the participation of applicability to benchmarking electronic public services and smart services in the new context of smart cities. Therefore, it will investigate how to extend this benchmarking methodology to include smart services in cities.

1.2 Research Statement & Research objectives

The specific objectives of this research are:

1. To analyse existing methodologies that are currently in use to benchmark e-government public services (e-Administration). Special attention has been given to those designed to benchmark local government. That process will help to identify the main characteristics for a new benchmarking methodology.

2. To design a methodology to benchmark e-government services at local government level combining provision of the services with the adoption by the citizens/businesses as users.

3. To validate the designed methodology by performing a measurement at the European level, which will confirm or refute some of the research hypotheses described in the next section.

4. To analyse the smart city phenomenon, identifying its main characteristics and understanding its impact on providing public services when smart services appear.

Research hypotheses

This PhD dissertation tries to answer the following research hypotheses:

H1: European cities share an important corpus of common services. This corpus is the basis for performing sound comparisons at the European level.

The importance of this hypothesis is clear: Should it turn out not to be true, then comparative evaluation cannot be performed. To verify this hypothesis, service coverage should be investigated with cluster analysis to see whether a cluster of services with high coverage can be identified. As I firmly believe the answer to the first research question will be yes, the first part of this research deals with the definition of this methodology and tests it in a real benchmarking exercise whose results will help answer the following hypotheses:

H2: The most mature or sophisticated services are also the most widespread.

It seems at first glance that the more mature or sophisticated a service is, the more citizens use it. For practitioners, this is an important hypothesis to verify or refute since usually the more sophisticated a service is, the more expensive it is to develop. To verify this hypothesis we have to investigate whether a significant correlation exists between service sophistication and service adoption.

H3: Cities are developing additional and more sophisticated services to attract citizens' attention.

There is a trend to create special, sophisticated services to capture citizens' interest and raise their awareness of new electronic channels. Therefore, cities are pushing for a channel shift in service provision. The research should verify whether additional services are more sophisticated than standard services.

H4: Additional services are more adopted than standard services.

Additional services are not mainstream services. Usually they are more attractive than standard services because they have been build to attract citizens' attention and raise citizens' awareness about the new channels. The verification of this hypothesis will confirm the success of such strategy.

H5: Big cities are performing better than small cities in e-government services.

Although there is a perception that small cities are quicker to innovate and show less reluctance to change, Moon & Norris (2005) argue that large city governments are more prone to adopt e-government activities because they receive more pressure to find ways to provide public services and disclose information.

1.3 Methodology

This is an evaluative research with a quantitative orientation. It cannot be claimed to be pure quantitative research since it works with a non representative sample due to the small number of cities surveyed.

The research techniques used for data gathering are literature review and surveys. The research included different tasks for collecting, analysing and interpreting empirical data. Therefore, this PhD research is based mainly on quantitative methods. Those have been used in the research design, sample analysis, variables definition and statistical data analysis. Induction and empirical analysis of the data helps to answer the research hypotheses. Qualitative methods are used at the beginning of the research as well as in the final part where no empirical data was gathered.

Literature review

Using published scientific papers and grey literature, the literature review is used to depict the state of the art. At the beginning of the PhD dissertation, it is the primary means for gathering data in the areas of benchmarking e-government and electronic public services. It is also used to define the main concepts, understand e-government to its full extent, and locate relevant studies and benchmarking surveys in the research field. The literature review is also key to introducing smart cities concept, open government and related services, as well as analysing the impact on city governance. Literature review has been used in the first phase of each of the published papers.

The literature published in the main scientific journals indexed in Web of Science and SCOPUS has been analysed. Although literature was regularly scanned from 2008 until 2015, an important number of references are older. The most cited papers have been reviewed and provide important insights and a source of new references. The main benchmarking surveys cited in the papers have also been used as a source of more references. Finally, grey literature has also been considered. Google and Google Scholar search engines have been used to search the keywords “electronic public services”, “e-government models”, “e-service adoption”, “e-government adoption”, “electronic government”, “e-government benchmarking”, “e-government evaluation”, “e-government 2.0”, “digital city”, “smart city” and “intelligent city”.

Surveys

In the early phases of this research in 2006, a survey was taken in 7 European cities to gather the most important characteristics of e-government city models. In developing the benchmarking methodology in late 2007 and early 2008, the same technique was used several times with the 18 members of the work-group. At the stage of applying the benchmarking methodology to a pilot measurement only 15 European cities were engaged. That survey gathered an important amount of empirical data from cities to be further analysed. Finally, a further survey was performed in the second half of 2013 covering 16 e-government managers, corresponding to the 15 cities that participated in the pilot measurement and one that did not. The survey aimed to assess the impact of such benchmarking.

In all data collection processes, data gathering has been based on self-assessment using questionnaires. In the pilot measurement, the survey inquired about 81 e-government services, their provision, maturity level and perceived citizen adoption. The survey was accompanied by the corresponding measurement framework in all three characteristics. 15 respondents assessed themselves on the main characteristics of the electronic offer of public services in their cities. For the impact survey, a questionnaire was circulated with 10 questions grouped into three blocks: impact of the benchmarking study on e-services improvement, new context of cities, and suggestions for improvements. Most of the 10 questions had several parts, and respondents were guided through multiple choice options, giving a total of 54 'simple' questions. Some questions were dichotomous and others based

on Likert scales. Some of questions also had free text input to allow respondents to clarify or make suggestions. 14 respondents provided data regarding the usefulness of the benchmarking instrument and pointed out different characteristics of the methodology to further improve it.

Quantitative Data analysis

After literature review, quantitative analysis is the main data technique used in this PhD thesis. Statistical analysis has been used to analyse the results obtained from the surveys. It contributed to the quantitative analysis and the validation or refutation of the research hypotheses. In addition, some indicators have been introduced to allow a better characterization of the services and cities, facilitating further analysis of the results.

In the pilot measurement, correlations, variance and cluster analysis has been used with data related to the services evaluated. Cluster analysis is fundamental to identifying groups and classifying services within these groups. It might allow us to identify and better justify the groups and categories of standard and additional services. Here, also, analysis of variance helped to assess differences between different groups of services. Services were classified into nine thematic categories: Channelling, Citizens' Engagement, Education, Employment and Business, Environment, Life Cycle, Social Care, Transport and Urban Planning. Average maturity and dispersion were calculated per service as well as per category, both at the city level and at the European level. The same was done for adoption. In the process of comparing provision and adoption of public services, computed correlations of sophistication and adoption levels for standard and advanced services have been used to refute or confirm hypotheses.

The sample of 15 cities that participated in the empirical research has been analysed based on a set of indicators that include: population, number of civil servants, average GDP, and household Internet access. Basic statistics show a sample quite close to the European average. The sample includes some capitals and second cities (see Table 4 of Batlle-Montserrat, Blat & Abadal, 2014). This means 10,087,736 inhabitants or 2% of the EU27 population, ranging from 144,043 (Rijeka), to 1,677,867 (Vienna), with an average of 672,516. Regarding age, the average was 40.2 years, compared to the European average of 40.6 in 2007 (source: EUROSTAT, 2008).

The local public organisations of these cities are rather diverse, ranging from small organizations such as Rijeka's (455 civil servants) to large ones such as Birmingham's (57,000 civil servants), with a ratio of inhabitant to civil servant ranging from 15 for Bergen and Helsinki to 241 for Tallinn to 317 for Rijeka. The average GDP per capita of the cities sampled was 26,744€, close to the EU27 average of 25,100€ in 2008, and ranged from 12,305€ (Rijeka) to 60,322€ (Bergen), which is a ratio of 1 to 5 compared to a EU27 ratio of 1 to 6, according to EUROSTAT (2008). As for household Internet access, the average was 61.4 %, ranging from 39.4 % (Murcia) to 91% (The Hague), while the EU27 average was 60% (source: EUROSTAT, 2008).

In the analysis of city profiles from the pilot measurement, both correlation and cluster analysis could be applied to analyse results provided the sample was large enough. Also here cluster analysis and analysis of variance help to assess the existence of different groups of cities in terms of how they are developing e-government projects. However, these statistical tools have not been used with this sample of cities. The quantitative analysis of the city profile has been restricted to the introduction of an indicator that characterized the homogeneity of the e-service offer.

The good practices list, derived from the pilot measurement, has been built based on two quantitative indicators that relate to outstanding maturity and acceptance. The list shows which services had the highest marks for those indicators.

The quantitative analysis of the impact survey has been performed using basic statistics (average, dispersion and correlation) once the reliability and validity of the test has been checked. The results obtained in the impact survey were accordingly checked with Kuder-Richardson Formula 20 or Cronbach's Alpha reliability test that showed considerable internal consistency in the answers, thus ensuring the validity of the results.

Qualitative Data analysis

At the beginning of the research, qualitative analysis techniques were used to perform a case study of 7 European cities (Barcelona, Birmingham, Munich, Stockholm, The Hague, Turin and Vienna). The main tools used were semi-structured interviews based on an initial framework of themes and basic questions that was send to the interviewees in advance (interviewers, themes and questions are in annex 2), who sent back to the interviewers a description of its e-government city model previous to performing the interviews. The interviews aimed at obtaining a detailed description of the e-government model of each city, analysing in-depth its deployment, as well as the supply and demand of e-services along with the factors that promote and condition its implementation at the local level and, probably, in other public administrations. The interviews were performed in autumn 2006. All the 7 cities accepted the interview thus reaching the 100% of the target.

In the final part of the PhD research, a case study is used to analyse the current context of e-services in cities, identifying the most relevant characteristics of the new scenarios of smart services resulting from open government policies, the increasing deployment of sensors in urban areas, and the participation of new actors in the public service arena. The case study includes a literature review, and uses a mix of quantitative and qualitative data that were gathered in observations performed on the city of Barcelona.

The following table summarizes the methodologies used in this research, which are discussed more in detail in the corresponding paper.

Paper	Aim	Technique	Implementation instrument /target//timing	Results	Data analysis	Validity
Local e-government benchmarking: limitations of comparative evaluation methods	To collect data to depict the state of the art and define the main concepts, understand e-government to its full extent. To locate relevant studies and benchmarking surveys.	Literature review	Academic papers published in the main scientific journals indexed in Web of Science and SCOPUS from 2000 until 2011. The main benchmarking surveys performed from 2000 until 2011. Grey literature.		Qualitative data. No statistics	Literature review standard procedure
European Study of E-government City Models	To collect data to perform a comparative analysis base on the e-government development in 7 European cities as well as verify key observations	Interviews	Semi-structured interview (appendix 2) performed in autumn 2006 to 7 e-government programme responsible	100% answers	Qualitative data. No statistics	Interview results were validated by interviewed
European Study of E-government City Models.	Data analysis	Case study	Comparative analysis of 7 cases. Cross-case search for patterns. Based on qualitative data. Performed in winter 2006	Identification of 12 common characteristics, and a common set of services	Qualitative data. No statistics	Statistically generalisable and analytically significant
E-Government Bench-learning Project	To collect data to depict the state of the art and define the main concepts. To locate relevant studies and benchmarking surveys	Literature review	Academic papers published in the main scientific journals indexed in Web of Science and SCOPUS from 2007 and 2008. The main benchmarking surveys performed from 2000 until 2008. Grey literature.		Qualitative data. No statistics	Literature review standard procedure
E-Government Bench-learning Project	To collect data	Survey	Structured questionnaire for e-service provision, maturity and adoption (appendix 1) passed to a sample of 18 cities in second half 2007	15 of the 18 cities answered. (83,3% of success)	Basic statistics: average, standard deviation, linear correlations Bar graphs	Standard deviation and correlation index

Paper	Aim	Technique	Implementation instrument /target//timing	Results	Data analysis	Validity
Benchmarking Municipal E-Government Services: A Bottom-Up Methodology and Pilot Results	To collect data to depict the state of the art and define the main concepts	Literature review	Academic papers published in the main scientific journals indexed in Web of Science and SCOPUS from 2000 until 2013. The main benchmarking surveys performed from 2000 until 2013. Grey literature.		Qualitative data. No statistics	Literature review standard procedure
Benchmarking Municipal E-Government Services: A Bottom-Up Methodology and Pilot Results	To collect data	Survey	Structured questionnaire for e-service provision, maturity and adoption (appendix 1) passed to a sample of 18 cities in the second half 2007	15 of the 18 cities answered. (83,3% of success)	Basic statistics: average, standard deviation, linear correlations. Bar graphs	Standard deviation and correlation index
ICING: Building the Cities of the Future	Data analysis	Single case study	Data gathered through the project documentation. Performed from 2006 to 2008	Description of the project characteristics and main contributions	Qualitative data. No statistics	Case report that is not statistically generalisable but is analytically significant
Towards benchmarking smart city services: impact analysis and methodology improvements for local e-government benchlearning	To collect data to depict the state of the art and define the main concepts	Literature review	Academic papers published in the main scientific journals indexed in Web of Science and SCOPUS from 2000 until 2015. The main benchmarking surveys performed from 2000 until 2015. Grey literature.		Qualitative data. No statistics	Literature review standard procedure

Paper	Aim	Technique	Implementation instrument /target//timing	Results	Data analysis	Validity
Towards benchmarking smart city services: impact analysis and methodology improvements for local e-government benchlearning	To collect data	Survey	Structured questionnaire (appendix 3) passed in summer 2013 to the 15 cities that participated at the first pilot measurement plus 4 cities that did not participate.	15 + 4 cities contacted. 10 + 1 answered (75% success)	Basic statistics: average, standard deviation, linear correlations	KR20 reliability index of 0.56 for all dichotomous questions. Cronbach's Alpha reliability test over 0.65 for all Likert scale based questions

Finally, the use of fuzzy set methods was explored to complement the benchmarking results with a more detailed analysis based on the diversity existing among the cities more than in the homogeneity, to help in the process of identifying good practices and translating them to other cities. These methods are especially appropriate for mixed research (Ragin, 2000; Ragin, 2013) since it offers a middle path between quantitative and qualitative measurements, and is suitable for medium sized data. However, at the end fuzzy sets methods were not used, since the initially foreseen further rounds of benchmarking at a larger scale were not performed.

1.4 Limitations of the research

The main limitation of the research is the sample of cities used for the empirical research. The cities used for the research voluntarily signed up to join a work group specifically created for that purpose. Although initially 18 cities signed up, only 15 participated in the empirical research.

The sample, although small, is fairly heterogeneous, reflecting the diversity of urban areas in Europe. It is quite representative of the European urban reality with the exception of the weight of large cities (the share of people living in cities over a million is 55% for the sample, while in EU27 it is 33%). Nevertheless, the pilot survey has no statistical significance, therefore it cannot claim to be representative of the local public-administration reality at the European level. The difficulties faced by European public administrations in the period after the pilot survey are the main cause of this gap, which still needs to be filled.

The same lack of statistical significance applies to the Service Catalogue. Although the bottom-up process used to define a catalogue of services came up with 81 services, this catalogue cannot be used to represent the common e-services provided at the local level in Europe due to the bias introduced by the sample of cities used in that process.

The research uses a services maturity framework, based on Gartner's e-government stage model (Baum and Di Maio, 2000) extended to a fifth level (Lee, 2010). But the use of Gartner's stages model needs to be revised. Actually, CapGemini stages describe e-services maturity levels better, although it also needs a revision to take account of the use of web 2.0 technologies in e-services provision. However, ICT sophistication is a moving target, and improvements in measuring maturity was one of the points of improvement suggested by city managers. These models need even more updating.

Self-assessment surveys were used to collect data because it is cost-effective. Although they are widely used and accepted in the majority of e-government, these surveys introduce another limitation to the validity of the results obtained in the pilot measurement. In order to overcome such limitation, the use of such questionnaires has been accompanied by specific training sessions to unify the assessment criteria across persons and cities.

Finally, another important limitation of the research applies to the adoption measurement. This metric has been measured indirectly through estimating the perceived actual adoption versus expected adoption at the launch of the service. It used self-assessment after training the person in charge of the service. Beyond the use of self-assessment surveys, the assessment of adoption should rely on the existence of an accepted measurement framework for adoption and the use of standard quantitative metrics related to adoption. Although in recent years the use of quantitative metrics has increased significantly, these two basic prerequisites are still far from being fulfilled.

1.5 Overview and organization of the thesis

This PhD thesis dissertation is based on the compilation of publications resulting from the work carried out from 2006 to 2015 in the field of electronic public services provided by local public administrations, although the PhD research formally started in 2010.

Through 6 published papers (Batlle-Montserrat, Abadal & Blat, 2011), (Rodriguez, Batlle & Esteban, 2007b), (Batlle-Montserrat, Calderón & Gascó, 2008), (Batlle-Montserrat, Blat & Abadal, 2014), (Batlle-Montserrat, Merino-Zapirain & Paternain-Soler, 2008) and (Batlle-Montserrat, Blat & Abadal, 2015) the methodology applied in the pilot benchmarking exercise is now grounded in the current academic context, and the results of the pilot survey are deeply discussed. A further step towards the validation of the methodology is the analysis of its actual impact on cities' e-government. In the context of this PhD thesis, this analysis has been undertaken some years afterwards by means of a new survey, and it is discussed to clarify the advantages and limitations of the methodology from a more empirical standpoint.

The first chapter introduces the PhD thesis, the motivations, the precedents, the research hypotheses, and the research methodology.

The second chapter presents a literature review to describe the current state of the art and help to frame the contributions made by the published papers. In addition, each published paper includes a specific literature review. Initially, the focus was on benchmarking e-government and benchmarking e-government services, extending the revision to maturity models, adoption of e-services, impact of e-government benchmarking and smart city. In these literature reviews, I tried to cover the different topics right from the start, compiling research literature covering a wide range of dates to understand the inception of the concept and the current state of the art, as well.

Chapters 3 to 5 of this PhD thesis include the 6 published papers. Although some of them were published before starting the PhD research, they are presented in a logical succession: situational analysis, design of the methodology and its test, impact assessment and characteristics of smart city services.

Chapter 3 analyses the basis for benchmarking e-government services in local public administrations. First, an in-deep literature review on e-government benchmarking (Batlle-Montserrat, Abadal & Blat, 2011) introduces the need to evaluate and compare e-government development and reviews the current tools and practices for e-government benchmarking. The paper clarifies the basic concepts of e-government and introduces the many and varied aspects of e-government, while highlighting the importance of measuring and benchmarking e-government. Then it introduces the e-government stages models that are currently in use and discusses the main characteristics and applications. The different e-government benchmarking surveys are analysed to show that e-administration is the most benchmarked e-government area. A more detailed analysis is performed on the most relevant surveys. The paper progressively focuses on benchmarking e-government at the local level, revealing that there are surprisingly few studies. Finally, it examines and comments on the limited usefulness of state-wide or regional benchmarking surveys when trying to extrapolate them to perform good measurements of local e-government.

A second paper (Rodriguez, Batlle & Esteban, 2007b) presents a study of e-government at the local European level carried out in 2006. The research, based on a case study of 7 major European cities, analyses how they are deploying e-government and reveals that there are common characteristics among European cities in terms of services provided. This confirms that European cities have in common an important base of services. These findings are key to establishing a comparative evaluation based on similar e-services rather than similar organizations.

Chapter 4 presents a bottom-up methodology to benchmark local e-government services and the results of their pilot measurement. First, Batlle-Montserrat, Calderón and Gascó (2008) describes the on-going project carried out within the EUROCITIES work group to define a methodology for benchmarking government at the local European level. The paper explains the bottom-up process of defining the methodology, which was carried out by the

cities involved in the benchmarking exercise. This process was designed as a way to ensure that the results are as relevant as possible for city managers who want to improve e-government.

After that, Batlle-Montserrat, Blat and Abadal (2014) describes the final methodology and discusses the results of the pilot measurement in a sample of 15 European cities. This paper, after a literature review, presents and describes in depth the methodology used to perform international benchmarking of e-administration. This methodology compares cities based on similar services offer instead of similar organizations, by introducing a catalogue of common services and including analysis of advanced services to deal with innovation trends. The methodology also takes into account citizen adoption as a measure and relates it to service maturity (measuring provision). It introduces a variety of indicators instead of an aggregate index and subsequent competitive ranking, profiles each city against a variety of global averages, and finally leads to a qualified service list hinting at good practices.

In chapter 5, Batlle-Montserrat, Merino-Zapirain and Paternain-Soler (2008) introduce a new generation of electronic services that are appearing in the context of smart cities. Using the example of the European Project ICING, this paper explores the new scenario and proposes a new ICT infrastructure to facilitate the generation of such advanced services. Following this paper, Batlle-Montserrat, Blat and Abadal (2015) analyse the impact of the benchmarking methodology used in the pilot measurement. Through this analysis, the paper identifies the main changes to be made in the methodology to improve its reliability and the quality of results. This refinement is mandatory before launching further measurements. In addition, the paper elaborates on the impact of the current scenario of electronic services in advanced cities, already introduced in Batlle-Montserrat, Merino-Zapirain and Paternain-Soler (2008), to pave the way for the future accommodation of the benchmarking methodology to compare cities based on the smart services available and used.

Following the published papers, chapter 6 is devoted to conclusions, and finally Chapter 7 presents future research needed in this area. The PhD dissertation closes with references and an appendix, including the artefacts or tools (e.g. forms) used to gather data in the pilot measurement and impact assessment.

The published papers included in this PhD dissertation can be found in the table below:

Title	Authors	Date	Journal	Index
Benchmarking del e-gobierno local: limitaciones de los sistemas de evaluación comparativa.	Batlle-Montserrat, Abadal & Blat	2011	El profesional de la información	ISI Social Sciences Citation Index (Q3), Scopus (Q2-Q3) SJR 2014=0.37 ICDS=9.862[1]
European Study of E-government City Models.	Rodriguez, Batlle & Esteban	2007	IDP. Internet, Law and Politics e-Journal	International Bibliography of Social Sciences, vLex, DIALNET ICDS=6.000
E-Government Bench-learning Project.	Batlle-Montserrat, Calderón & Gascó	2008	In *Collaboration and the Knowledge Economy: Issues, Applications, Case Studies.* Proceedings e-Challenges 2008. IOS Press	Book Citation Index Thomson Reuters
Benchmarking Municipal E-Government Services: A Bottom-Up Methodology and Pilot Results.	Batlle-Montserrat, Blat & Abadal	2014	International Journal of Electronic Government Research	Scopus (Q2-Q3) SJR 2014=0.29 ICDS=8.500
ICING: Building the Cities of the Future.	Batlle-Montserrat, Merino-Zapirain & Paternain-Soler	2008	UPGRADE. The European Journal for the Informatics Professional	Directory of Open Access Journals ICDS=3.000
Towards benchmarking smart city services: impact analysis and methodology improvements for local e-government benchlearning.	Batlle-Montserrat, Blat & Abadal	2015	Information Polity	Scopus (Q2-Q3) SJR 2014=0.47 ICDS=9.880

1 Index ICDS (Índice Compuesto de Difusión Secundaria) established by MIAR - Information Matrix for the Analysis of Journals (http://miar.ub.edu/)

2. Literature Review

This literature review presents de main concepts of this PhD dissertation and complements the motivation of the PhD research exposed in chapter 1. An initial literature review was performed in 2008 reviewing the most important surveys benchmarking e-government at global, regional and local level. It was included in (Batlle, Calderón & López, 2009). Nevertheless, during the PhD research, a new literature review has been performed, scanning the papers published in the main scientific journals indexed in Web of Science and SCOPUS. In addition, the main benchmarking surveys cited in the papers, and grey literature have been also considered. Different fragments of this literature review can be found in the different papers compiled in this PhD dissertation.

The literature review is organized in ten sections starting with the definition and importance of e-government, as well as the characteristics of local e-government. It introduces the e-government maturity models so as to frame the discussion on comparative evaluation and benchmarking in a better way. Next, the benchmarking of e-government, and the benchmarking of e-government services are introduced. The most important surveys benchmarking e-government are analysed and discussed. Then the review focuses on benchmarking e-services in cities where literature is scarce. The following section reviews the literature related to the adoption of e-government services searching for the reasons to explain the scarcity of surveys tackling the provision and adoption of e-services. The next section is devoted to impact assessment of e-government benchmarking, where again, little literature has been found. The final section is devoted to smart cities and new trends in e-services.

The review of the literature shows, that, despite the importance of local governments in public service provision, there is a lack of academic literature and of scientific reports devoted to the evaluation of e-administration at a city level. There are no methodologies to benchmark e-administration tailored to local government specificities. No common references are established to compare cities regarding the quality of their public service offer. Despite the abundance of benchmarking studies of e-government, these have focused primarily on the state level and only a few studies deal with the local level. Moreover, the few surveys aimed at benchmarking local e-government are focused on analysing general aspects of the official website as content, accessibility, quality and usability, thus not paying attention to electronic services delivered by the city government.

Furthermore, our literature review shows that there are no studies, and no benchmarking dealing with supply and demand, that is to say, the provision of services and the citizens' adoption, neither at state level nor in local public administration. It has been found that very few studies consider the degree of adoption or actual use of services by citizens. Which means that public services are evaluated mainly on the offer side without considering the "purchasing" or actual use of these services by citizens as an indicator of success.

To conclude, a complete view of the e-government process in cities is not possible today. Research papers also suggest that current approaches to monitoring evaluation and benchmarking e-government development do not support a comprehensive e-government assessment and need to be improved in order to give policy makers elements for their decisions. Therefore, there is still room for additional research in the field of benchmarking online public services in cities.

2.1 E-government

There is a succession of terms used in literature as synonyms for the same concept: electronic government, online government, government IT, digital government, electronic governance, e-governance and, more recently, e-government, the latter being the most used in this work.

Kaylor et al. (2001) define e-government as the ability to communicate and/or interact with government agencies via the Internet in any way more sophisticated than a simple email letter. Other authors define it as the electronic provision of information and services by governments 24 hours per day, seven days per week (Moon & Norris, 2005). Both are narrow definitions of e-government because they focus only on the citizens' interaction through Internet, although it is probably the most popular definition of e-government (Bannister, 2007).

Usually, more narrow definitions of e-government have been formulated in the context of specific studies, as, for instance, Layne and Lee (2001) that places the focus on a specific technology, Internet and the World-Wide-Web, and its capability to enhance the access to, and the delivery of, government information and services to citizens, business partners, employees, other agencies, and government entities. Other authors, focus on the efficiency rather than the technology. Carter and Bélanger (2005) define e-government as the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies. According to the World Bank (Lanvin and Lewin, 2006) e-government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that are able to transform relations with citizens, businesses, and other branches of government.

Therefore, although they are open to Information and Communication Technologies (from now on ICT) in general and are not restricted to Internet, these definitions have a specific narrow focus. Authors use these definitions with a twofold purpose: to define the term and to focus the attention on a specific part of the public administration functions, and thus they should be considered as incomplete definitions of the term. These narrow definitions that are instrumented to justify some specific studies can only be accepted in the context of such studies.

In fact, e-government is a much more substantial transformation than e-service delivery (Löfstedt, 2005), it is far greater than using Internet or providing services through internet, or even improving the services. E-government is much more than gathering the information, downloading files or making online transactions (Sakowicz, 2003). e-Government refers to the use of ICT in public administration.

Such a broad definition of the term allows the researchers to see e-government in all of its extension, impacts and benefits. To be more specific, some authors (Janssen, 2003) provide a detailed definition of the term, listing different components or applicability areas related with different public administration functions such as internal use, services provision or citizens participation, to mention some of them. Other authors present e-government through the potential benefits or impacts: "e-government utilizes technology to accomplish reform by fostering transparency, eliminating distance and other divides, and empowering people to participate in the political processes that affect their lives" (Al-Hashmi and Darem, 2008). Both approaches are useful to emphasize that e-government is not simply a matter of giving government officials computers or turning the current processes into digital ones, but the new aspects the emerge with these processes.

Although all these broad definitions of the term are valid, the most used is the one provided by the OECD (2003) that defines e-government as the use of ICT, and particularly the Internet, as a tool to achieve better governance. Or, in its long formulation, "*e-government applied to the use of information and communications technology to public administration tasks and processes, and aimed at reshaping government to citizen relationship, government to government, public services provision, internal efficiency and citizens participation*".

Thus e-government is not restricted to specific technologies or tasks. Therefore, as technology evolves and is applied to more fields, e-government will extend inside other public administration functions not yet involved in e-government (i.e. the city infrastructure management which is currently experiencing a deep transformation thanks to the new ICT solutions based on sensor networks and command centres). All these new cases of application of ICT in government functions should also be considered as part of e-government.

As e-government is embracing all the functions that a public administration is doing, different aspects of ICT are considered as well as several areas of applicability or components can be found in e-government research (e.g. ICT internal adoption, internal business process re-engineering, IT management, IT project assessment, interoperability or the relation with other public administration levels, e-government evaluation, etc.). Janssen (2003) takes a more systematic approach identifying five main e-government components: provision of ICT infrastructure and ICT skills to facilitate citizen's inclusion named e-society, automation of internal processes, providing citizens with better services (e-administration), including citizens in policy (e-participation), and changing the relation between politics and administration.

This broad definition of e-government is the one this PhD dissertation shares. Its wide view gives room for different sub-disciplines, being e-administration (i.e. the provision of better services to citizens) the one in which the research will focus on.

2.2 Local e-government

E-government is a general phenomenon affecting all public organisations. However, it is in cities and local governments where it takes on its full dimension and relevance, because the city council is the public organization closest to citizen and provides more services than any other administration. In Europe and other developed countries between 50% and 80% of the interaction of the citizen with public bodies takes place at sub-national level (Moon & Norris, 2005, Heeks 2006). Moreover, Schellong (2010) noticed that in countries with a federal government structure, most public services relevant to citizens are produced, offered and used at a local level.

The same happens in US where local governments are the governments closest to the people. According to Norris (2005), local governments are key players because what they do directly impacts citizens, far more, and in a more immediate way, than the actions of state or federal governments, because local governments deliver the vast majority of services that directly touch the lives of citizens. And this proximity to people also makes it important in e-participation and e-democracy (Sakowicz, 2003). Indeed, the local government is the "front-office" for general public services, the main point of contact for citizens and the administration that provides more services to citizens.

The importance of local e-government is increasing day by day. According to Lanvin and Lewin (2006) specific e-government services are increasingly handled at the local rather than the national level. This is the case, for instance, for small and medium-sized enterprise (SME) registration, vehicle and drivers' licenses, enrolment at educational institutions and vocational programmes, furthering human resources skills, or professional authorizations and licenses (for example, for shops, pharmacies, and so on). A similar trend is detected in Australia where municipalities had to re-frame their processes to accommodate the expectations of their communities (Shackleton, Fisher, & Dawson, 2004). This importance is being reinforced by the increasing role played by cities as, according to the World Bank (Lanvin and Lewin, 2006), in the last 50 years the proportion of population living in cities had increased to one-half, and it is estimated that, by 2050, six billion people (that is, two-thirds of the world population) will live in cities. In such a context, maintaining adequate levels of production and delivery of key public services is a major challenge for cities.

E-government at local level has its own specificities. All the definitions and components presented in the previous section apply to local e-government, but in addition, cities and municipalities are developing specific functions that cannot be found at other levels. City services provision and city management (e.g. traffic management, public transport, environment, pollution, cleaning, waste collection, public lighting, culture, education, social care, crime contention, flood control and disaster management) are traditional

functions of the local public administrations that are increasing the use of ICT considerably, and are not included in other public agencies. In addition, in some countries, cities have to deal with basic service provision such as water supply, gas and electricity. All of these are specific functions that cannot be found in other levels of public administration. Therefore they are giving a special flavour to local e-government by adding specific components.

These characteristics make local e-government an interesting research subject. However, despite the increasing importance and own specificities of local e-government, it lacks information and research related. According to Wohlers (2007), "*an increasing body of research examines the breadth of e-government at the international and national levels, while a systematic analysis of e-government at the local level and across different population sizes remains scant*". This is still valid today. In the following sections we will have the opportunity of seeing more examples of this unbalanced situation.

2.3 E-government maturity models

Before facing the evaluation and benchmarking of e-government it is important to introduce the e-government maturity models. The development of information systems architecture can evolve through a number of phases or stages of growth (Janssen & van Veenstra, 2005). In this section, the existing models of growth applied to e-government are presented and discussed. Despite their utility, these e-government models do not reflect the real complexity of the e-government model and need to be updated to follow the evolutionary nature of e-government.

Stage models or maturity models aim at de-constructing information systems architecture development into a series of stages. Development or evolution goes from one stage to another (Andersen & Henriksen, 2006). This general approach also applies to e-government as a process in which information systems architecture plays a key role. In that case, it also takes the name of e-government models. Therefore, e-government models, stages of growth, models of maturity or models of sophistication are all synonyms when applying them to e-government.

The early models

Although stages models were introduced years before, the main e-government models appeared in 2000 and 2001 (Baum & Di Maio, 2000; Hiller & Belanger, 2001; Layne & Lee, 2001; Ronaghan, 2002; Wescott, 2001). Several authors proposed different e-government models. All of them illustrate the organizational stage in an e-government development process (Andersen & Henriksen, 2006) and outline the structural transformations of governments as they progress toward electronically-enabled government (Layne & Lee, 2001).

E-government models are important because they are offering a basis for measuring e-government development degree and for guiding strategies (Andersen & Henriksen, 2006). According Norris (2009), models are providing a good framework to assess development level which are easy to use and shared by other practitioners. It is thanks to the existence of these models that e-government benchmarking progressed. Therefore, e-government models proved to be a useful tool to assist policy makers in devising their own plans and initiatives (Al-Hashmi & Darem, 2008).

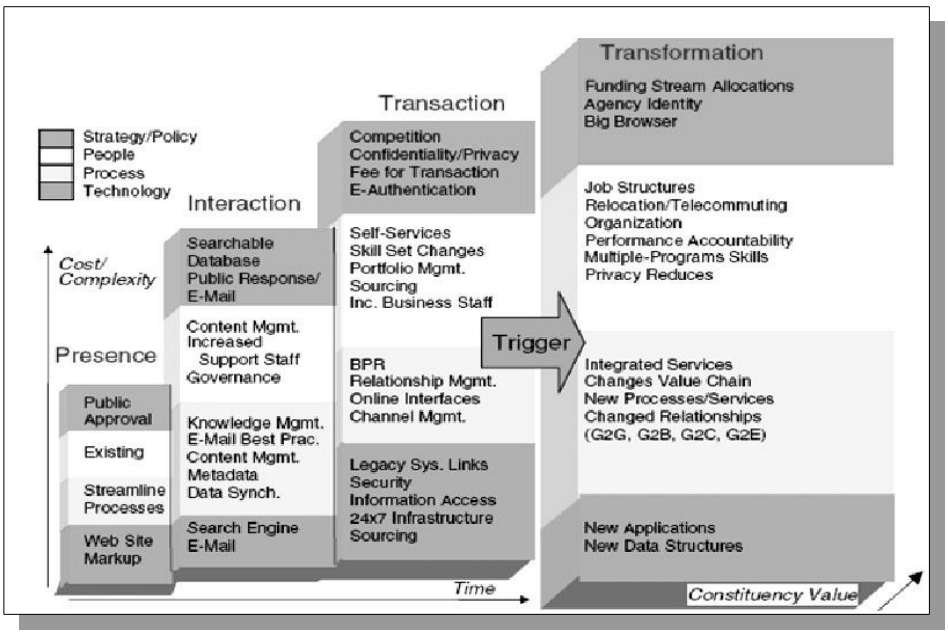


Figure 1: Baum and Di Maio e-Government model

However, the enormous diversity that is included in the e-government definition means that designing a general assessment model is very complicated and it is almost impossible to include all possible variants (Kunstelj & Vintar, 2004). This multifaceted reality of e-government is also the reason why several e-government models appeared.

Some of the e-government models are focused on internal IT adoption and organizational changes (Layne & Lee, 2001), others[2] have been designed to model development of web content, or services provided through Internet (Ronaghan, 2002), others are oriented towards classifying projects in an overall evolution of and e-government strategy (Baum & Di Maio, 2000) or focusing on technology infrastructures for e-government such as the IBM model (Nguyen, Sansoni, & Le Noir, 2003).

The Baum and Di Maio model (Figure 1) is also known as the Gartner's e-government model. It was first published in 2000. It is a four-stage model aimed at classifying e-government projects. The first stage is a mere web presence, in which governments provide basic information online. Next is a stage in which citizens can interact with governments online. In the third stage this interaction is transactional. Citizens can conduct business

2 United Nations Division for Public Economics and Public Administration

online with governments. The final stage implies a transformation of the relationship between citizens and governments. These changes due to e-government produce a much more citizen-centred and responsive government.

Layne and Lee defined in 2001 a four stages model (Figure 2) to describe organizational changes towards a full enabled e-government. The first stage is "catalogue", it is similar to the initial stage of the Baum and Di Maio model. It is characterized by a basic web presence providing static information. The second stage called "transaction" includes online forms and services supporting online database access. The third stage is characterized by the vertical integration with other public agencies processing related functionalities and finally in the fourth stage appears the horizontal integration of information and services which means the sharing online data and information across departments within governments and among governments to provide the final service.

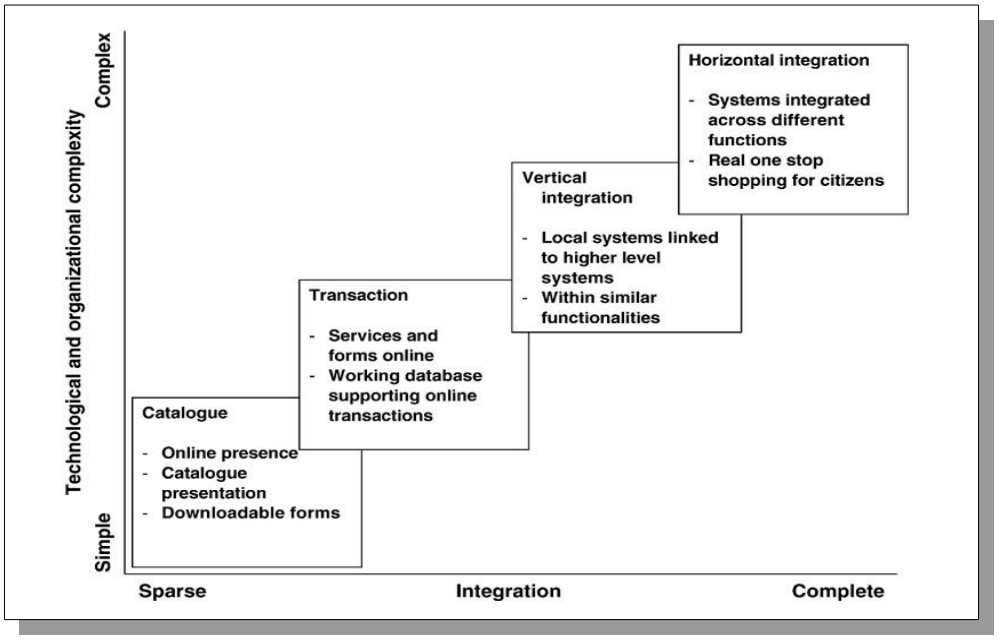


Figure 2: Layne and Lee e-Government model

The Hiller and Belanger model, also introduced in 2001, has five stages. It starts with "information", followed by "two-way communication". The third is "integration", followed by "transaction" and finally "participation". This latter stage, what makes the difference with previous models, is close to e-democracy and permits citizens to participate electronically in their governments.

Despite the existence of several e-government models, the European Commission chose a new model (from now on the Cap Gemini model) based on the method developed by the Dutch government. It is a four-stage model to measure the level of online sophistication of the services. This model was adopted for Cap Gemini Ernst & Young in 2001 (Cap Gemini, 2002, 2003, 2004, 2005, 2006) to perform the survey on electronic public services

commissioned by the European Commission in the framework of the eEurope 2002 Action Plan (EC, 2000), becoming a standard de facto. The four levels are defined below:

1. Information: online info about public services
2. Interaction: downloading of forms
3. Two-way interaction: processing of forms, including authentication
4. Transaction: case handling; decision and delivery (payment)

Another stage model designed for official website assessment that is worth commenting on is the one used by United Nations in its e-Government Survey performed in 2003, 2005, 2008 and lastly in 2010. Initially the proposed model defined by Rutgers University was based on four stages. The first stage is when there is no information at all on the website. In tat case, it scores zero. Therefore, to better compare this model with the previously exposed it can be considered as a three-stage model. The stages are defined as follows:

1. Information about a given topic exists on the website (including links to other information and e-mail addresses).
2. Downloadable items are available on the website (forms, audio, video, and other one-way transactions, pop-up boxes).
3. Services, transactions, or interactions can be carried out completely online (credit card transactions, applications for permits, searchable databases, use of cookies, digital signatures, restricted access).

These first models suggest a lineal, stepwise and progressive evolution increasing in complexity and sophistication (Baum & Di Maio, 2000; Layne & Lee, 2001). Each further step in the models' predicted evolution of e-government produces more e-government and e-government qualitatively better (Norris, 2009). As it has been said, their strength is that they propose a practical and comprehensible framework (Baum & Di Maio, Layne & Lee) easy to use.

In the models defined before 2006, there are some problems; one is regarding the pro-activity and services simplification/integration which leads to a service suppression as the highest stage of e-government maturity. According to Janssen, Rotthier and Snijkers (2004), that means "neglecting the more fundamental process of re-defining service delivery in an online environment", a process that leads towards fewer but better services.

When analysing advanced public services, those models are not working correctly. There is a problem with levels of interactivity and interoperability or integration. There is no way to reflect reach interaction and participative service provision by means of web 2.0 technologies.

The initial purpose of the Cap Gemini model was services maturity assessment. That is why it uses four stages to reach transaction level while other models only use two (Layne & Lee) or three (Baum & Di Maio) to reach the same level of sophistication. This characteristic makes the model more suitable for explaining the e-services development, since it offers more detailed and incremental stages of sophistication. On the other hand, it doesn't evaluate either organizational e-government action such as the e-government re-designing of back-office procedures, or service availability through other channels, or the adoption and the use of these services, or the impact of the e-government programmes.

But despite the fact that it focuses on service delivery, the model does not take into account service integration (Janssen, 2003; Kunstelj and Vintar, 2004), pro-activity and advanced services. It is again a lineal model, although it has been recognized since its inception that not all services can or should evolve through all sophistication levels.

The extended models

Janssen (2003) observed that the existing models proved to be a useful tool for incipient and mid-term e-services development but do not reflect the characteristics of the most advanced actions in service provision correctly. And he stated that more research was needed in this area. In this sense the extended version of the Cap Gemini and UN models propose some corrections to solve some of the aforementioned problems.

Janssen, pointing out what the aim of e-government in service provision should be, noted that existing models are not useful in high levels of sophistication. According to this author, the highest levels of sophistication might actually be the proactive completion of the transaction within government or even its elimination.

In this sense, the Cap Gemini model evolved in 2007 adding a 5th level of sophistication called “personalisation” to reflect the concept of pro-active service delivery, (i.e. the government pro-actively performs actions to enhance the service quality and the user friendliness), and the idea of automatic service delivery (i.e. the government automatically provides specific services to citizens or business, so there is no need for the user to request the service)(Cap Gemini, 2007)(Cap Gemini, 2009).

In addition, the UN model was further extended in order to take into account new trends in electronic service provision based on the introduction of web 2.0 technologies. The extended model was presented as a four-level model in the 2010 edition as follows:

1. Emerging information services. Government websites provide information and links to ministries, departments and other branches of government.

2. Enhanced information services. Government websites deliver enhanced one-way or simple two-way e-communication between government and citizen, such as downloadable forms for government services. Some limited e-services enable citizens to submit requests which will be mailed to their home.

3. Transactional services. Government websites engage in two-way communication with their citizens. Electronic authentication of the citizen's identity is required.

4. Connected services. Government websites have changed the way governments communicate with citizens. They are proactive in requesting information and opinions from the citizens using Web2.0 and other interactive tools. E-services and e-solutions cut across the departments and ministries in a seamless way. E-services are targeted to citizens.

But these extended models still do not explain the observed evolution of some services in terms of interactivity and interoperability. This problem was already pointed out by Kunstelj and Vintar in 2004. This author noted that lineal models do not allow the right levels of interactivity and interoperability or integration in electronic services to be explained. Sophistication and integration should be seen as two different variables, two different dimensions. One, the sophistication of a service is a front-office measure of how much can be accomplished online, the other one, integration of a service reflects how mature and advanced the back-office is (Heeks, 2006). Therefore, according to Kunstelj and Vintar, two-dimensional models should be developed.

In that research line, recently, Heeks (2015) tackled the difficulties of the multidimensional approach introducing the Manchester e-Government Maturity Model based on two dimensions. This maturity model of e-government takes into account not only the maturity in the front-office but also in the back-office. It seems a good alternative for e-services maturity analysis that grasp the current trends in e-services provision. In this model, citizen-led service provision is at higher maturity stages.

To conclude, it should be noticed that according to Norris (2009), the models of e-government "*were developed in a vacuum*". Which means that they were not based on research or on a careful reading of relevant bodies of literature. They were also technologically deterministic. As such, "*they were almost certainly destined to be wrong*". And that must be taken into account when evaluating a specific e-government area. Models are providing a good framework to assess development level easy to use and shared by other practitioners, but at the end, they are an incomplete description of the reality.

2.4 Benchmarking e-government

Nowadays, e-government "*is a major paradigm shift in the way that government and public administration have to function*" (Peristeras, Tsekos, & Tarabanis, 2002). In this process e-government in all its extension is being deployed to transform public organizations into more efficient and effective organizations, delivering higher quality services, and increasing transparency, citizens' participation and accountability (EC, 2007). And it is a process that requires enormous investment by governments (Alshawy, Alahmary, & Alalwany, 2007).

This transformation that started some years ago is no longer just an option but a necessity for countries aiming for better governance (Gupta & Jana, 2003). As it is an evolutionary phenomenon, all the e-government initiatives should be accordingly derived and implemented (Layne & Lee, 2001). Policy makers and city managers must carefully manage the process to shorten it and ensure a successful end. They can and should use the experience of previous innovators as a guide to make informed decisions (Kaylor et al., 2001), to answer some of the questions they have:

- How is my city doing in e-government?
- Are the current e-government strategy/investments showing expected results?
- Is the e-government strategy well-balanced?
- What are the most advanced areas of e-government service provisions?
- What are the best practices in Europe to learn from?
- Where and how should my city improve the e-government agenda?

The answers to these questions can only come from evaluating, measuring and comparing e-government. According to Kunstelj and Vintar (2004), evaluation and comparison are the key tools for discovering the current state of e-government development, working out the extent to which objectives have been reached, validating the effectiveness of strategies and action plans, ascertaining strengths and weaknesses, shaping new guidelines or looking for examples of best practices. And that is why the European Commission is also promoting e-government evaluation, measurement, benchmarking and case-based impact and benefit analysis based on common indicators (EC, 2006).

But what is the difference between evaluation, measuring and benchmarking? Jones, Irani, Sharif, and Themistocleous (2006) state that evaluation aims to determine the value and benefit derived from the e-government investments. According to Jones, Irani, and Sharif (2007), this analysis should investigate various user perspectives (i.e. citizens in general and specific target groups of citizens since their specific needs would require particular e-government services (Janssen & van Veenstra, 2005)), consider social and technical context of use (Alshawy et al., 2007) and identify and quantify benefits.

Benchmarking is a business management practice used mainly for marketing and sales purposes that has been applied in many different fields such as, for instance, education, industrial development or country development. It refers to performing systematic comparisons with competitors in order to visualize the leadership and the positioning of a company within a list or ranking of companies. Applied to the field of e-government, these comparative exercises contribute to a broader view of the reform process in which public organizations are undergoing, identify leaders and followers, understand different stages of growth and identify best practices at the national and international levels (Heeks, 2006).

Hence benchmarking becomes over time a more common practice in public sector management, acting as a “reality check” for managers and policy-makers and allowing them to measure the progress (Hachigian, 2002). In a successful execution of an e-government strategy, benchmarking through indicators is a critical component of the implementation process (Graafland-Essers & Ettedgui, 2003).

Both evaluation and benchmarking are private sector techniques introduced into public sector management in order to measure public sector outcomes and performance (Noordegraaf, 2003; Cole & Parston, 2006). Although recognizing the importance of e-government evaluation, this research focuses on e-government benchmarking.

The review of the most recent papers issued in impact publications reveals the current interest in how e-government is performing. Norris (2009) analyses how in just about the last fifteen years (from the mid-1990s to 2009) national, state and local governments around the world have been implementing and expanding official websites. In this analysis he concludes that e-government has not developed lineally as was initially foreseen in early e-government models. It has not evolved into e-democracy or e-transformation as foreseen. Moreover, he highlights that e-government models must be reviewed and notes that local e-government today remains mainly about delivering information and services online.

The implementation of e-government is a process of change that needs to be carefully planned and managed by politicians and public managers to reduce its duration and the objectives pursued. E-government is a process that involves multiple stages or phases of development (Al-Hashmi & Darem, 2008) and touches the core business of public administrations and, therefore, needs to be well managed to shorten it and ensure a successful outcome. And this is where benchmarking can be a useful tool.

According Kunstelj and Vintar (2004), one of the key instruments to manage e-government transition better is benchmarking. Benchmarking e-government informs about the current level of development, determines to what extent the objectives have been achieved, allowing the validation of the effectiveness of strategies and action plans, and determining the strengths and weaknesses of these. Finally, it helps to find examples of good practices to learn from. In the European context, benchmarking e-government has been identified as a key tool for measuring the progress made in achieving the objectives established by the European Council. In the eEurope 2002 Action Plan (EC, 2000) the European Commission highlighted benchmarking practices as the right tool to ensure that actions are carried out efficiently, have the intended impact and achieve the required high profile in all Member States.

Kunstelj and Vintar conducted in 2004 a systematic study of the existing e-government benchmarking. They counted on a total of 40 comparative studies, of which 14 focused on aspects of "e-readiness" or the degree of internal adoption of ICT by the public body, 15 evaluated the "e-readiness" of the citizens and businesses (degree of use of IT by these groups), just 2 focused on the "back-office" or internal management processes (although other four included the “back-office” somehow); 26 were focused on the provision of electronic services, 14 treated the adoption of electronic services by citizens and businesses, but only 3 confronted the supply and demand for online services; 4 focused on the impact and benefits of e-government, which was an additional issue in other 6. Note that a specific benchmarking can address more than one dimension of which we have pointed out.

Two years later, Codagnone et al. (2006) conducted a review and updated the Kunstelj and Vintar study, presenting a list of 64 surveys benchmarking e-government. They grouped the surveys into four categories: "e-readiness", offer or delivery of electronic public services (i.e. e-administration), demand, and impact. They found that the situation had not changed significantly. The vast majority focused on the supply (number of services available online) or on "e-readiness", and an increase still limited of those studying the application or adoption of electronic services (i.e. acceptance and satisfaction with services by their users) was detected.

Taking a look at the geographic dimension, it can be observed in the Kunstelj and Vintar study that 7 of the surveys applied to European Union countries (EU-1514) and 7 are worldwide, the rest are focused on specific countries. Notice that there are no surveys focused on the local level. Löfstedt, (2005) and Heeks (2006) concluded that the majority of benchmarking surveys are focused on national e-government. Moreover, Lanvin and Lewin (2006) highlighted the fact that despite the analytical efforts that have been made to describe local e-government initiatives and their good practices, remarkably little attention has been given to measuring it in sub-national spaces, including cities.

2.5 Benchmarking e-government services

Both Janssen (2003) and Lambrinoudakis et al. (2003), identified in e-government a component directly related to the public services provision, which means the interaction between citizens and public administration and companies and public administration. It is what Janssen (2003) calls e-administration. E-administration aims to provide citizens with effective and efficient service delivery. This component includes not only the services' provision but also other related aspects such as the online services take-up or adoption, the multichannel service provision, the service quality or user satisfaction.

In 2010, the Economist Intelligence Unit along with Siemens Global Centre of Competence (Siemens AG, 2010) performed a survey in 15 cities of over 1 million inhabitants in 12 different countries. In the survey citizens, public officials and business executives were asked about competitiveness, environment, infrastructures and public administration. The survey shows the huge interest of e-government services for business and citizens. E-government services is one of the areas that business executives claim have a major impact on competitiveness. According to the survey, citizens are still unsatisfied with the efficiency of public services but think that ICT can improve service delivery. In addition, citizens perceive that e-government services can have a positive impact on their quality of life, especially those related to participation. Therefore, e-services provision or e-administration is still one of the main e-government topics.

As can be observed in Kunstelj and Vintar (2004) and Codagnone et al. (2006), despite the potentially broad scope of e-government, currently, most studies have concentrated on measuring the front-office, the e-administration (Janssen, 2003; Kunstelj & Vintar, 2004),

which is the area related with official web pages and e-services. It is worth clarifying here that benchmarking e-government services should not be confused with benchmarking official websites as usually happens. Indeed, benchmarking online service provision is not benchmarking only the service provision through the website, since it should take into account all electronic channels used to delivery those services to citizens (e.g. web, kiosks, digital TV, mobile apps).

Two important aspects contribute to maintaining e-services benchmarking on the focus of practitioners and academics. One is the inherent importance of the front-end: in public administrations, the front-end includes official web page and e-services provision and both are the most visible parts of e-government (Janssen, 2003). The front-end is at the focus of policy makers and public managers due to its high impact in the constituency. And that leads us to the conclusion that, in practice, e-government is still perceived mainly as delivering governmental information and e-services (Norris, 2009).

The second is the existence of a well established standard in terms of e-government maturity models (introduced in a previous section) and indicators. As a lot of academics have pointed out (Janssen, 2003; Kunstelj & Vintar, 2004; Griffin, Foster & Halpin, 2004; Heeks, 2006; Lee, 2010) these models measuring service sophistication are well known, comprehensible and simple to apply, and are thus widely used in benchmarking.

2.6 Analysis of the most important surveys

In the area of e-services, some important e-government benchmarking have been performed. An in-depth reviewshows that little attention has been paid to local e-administration, where not a lot has changed since this was commented on by Lanvin & Lewin (2006). Up to now, the comparisons have been performed mainly at a state level (Kaufmann et al. 2009; CapGemini Ernst & Young, 2013; OECD, 2007; OECD, 2009; UN, 2010; UN, 2013). The few benchmarking reports that focus on the local level do not analyse the complexity derived from the richness of local e-services (Holzer & Kim, 2007) with the clear exceptions of Kaylor (2001), Shackleton et al (2004), Flak et al (2005) and Löfstedt (2007).

In addition, they focus on providing an aggregated index as the main output. According to Jansen (2010) e-government benchmark studies often take a quite simplistic view of government websites and services, and draw sweeping conclusions about their performance. Most e-administration benchmarks provide an aggregated index of all the marks into a final score as their main result. Although global governance benefits from having such an index and the rankings proved to be effective to push European member states to progress in e-service provision, an aggregated index is of little help for practitioners (Hicks, 2010) as it provides insufficient detail to learn from, when the main goal of benchmarking should be that organizations improve their performance (Jansen, de Vries & van Schaik, 2010). Another drawback is that a method for reaching such an

aggregate index must be chosen, and as there are usually no fixed or agreed rules to do so (Bannister, 2007) sometimes erroneous decisions are taken (Whitmore, 2012).

Nevertheless, it worth analysing the most relevant ones and discussing the methodology and the applicability at city level.

CapGemini Ernst & Young Online Availability of Public Services

The CapGemini Ernst & Young benchmark (CapGemini, 2003), developed for the European Commission within the framework of the eEurope action plan and launched in 2001, was designed to promote the online availability of public services amongst European Union member states. During its 10 editions, it proved to be a key tool for member states to improve public service availability and a valuable source of information to track the progress of European e-government. It is based on measuring provision and sophistication of 20 public services defined to be basic. However, most of them are under state responsibility and are not provided by cities, making it not very useful for them. Only the 9th edition recognizes the importance, diversity, and specificity of city services, introducing a few comparisons regarding their sophistication. The 8th edition (CapGemini, 2009) is the first to address adoption by users, by comparing the sophistication of the e-services provided with a general uptake of e-services, based on Eurostat data, which, as the OECD (2009) noted, are not directly comparable. The 10th edition (CapGemini, 2013) collected data on the use of e-services, barriers for using them, preferred channels, user satisfaction, and perceived benefits through an internet survey involving 28,000 citizens in 32 EU countries, with 27 questions about the 19 most common services. It is an important step forward with respect to addressing adoption but it still does not apply to cities.

Digital Governance in Municipalities Worldwide

The Digital Governance in Municipalities Worldwide (Holzer & Kim, 2007) is a rigorous assessment of the practice of digital governance in large municipalities worldwide. It was executed in 2003, 2005 and finally in 2007, and the last edition includes a longitudinal assessment over the three editions. It evaluates the website of each city in terms of the delivery of public service and citizens' participation in governance and ranks the websites. It specifically assesses the categories services provision, privacy/security, usability, content, and citizen participation. The results are presented as an aggregated index and the associated ranking of cities provided. It also delivers the ranking in each of the individual categories. In provision, it checks 20 city-specific services, and each service, when provided, is assessed in terms of maturity with a reference framework of three stages (against four in the European benchmarking mentioned in the previous paragraph). At the end, the main characteristics of the homepage of the higher ranked cities are discussed, which is useful to identify good practices. From the point of view of e-administration, it is limited, as service provision is only one of the five categories analysed and only 20 services are considered, not taking into account the rich variety of services a city provides (our survey identified 81). As with most benchmarks, citizens' adoption of the services

provided is not considered. On the other hand, the number of services offered by a municipality through its website is not enough to assess how well this organization is performing in e-administration, nor the maturity of the services offered.

United Nations e-Government Survey

The United Nations e-Government Survey (UN, 2013) focuses on measuring progress in online service delivery by national governments around the world. It comprehensively covers the 193 Member States, assesses the technical features of national websites, and the e-government policies and strategies applied in general and in specific sectors for the delivery of essential services. Results are presented by means of a composite index, the UN E-Government Development Index (EGDI), measuring the willingness and capability of national administrations to use information and communication technology to deliver public services. The index leads to a ranking of the countries. In the last edition, citizen's use of e-services (the so called 'demand-side') is recognized as a priority, as measuring and reporting the usage level have become important to assess and demonstrate the benefits of e-government initiatives and ensure continued support. Most benchmarking focus only on service provision, but do not take into account the level of use or customer satisfaction and thus have little or no credibility (Bannister, 2007). The UN survey identifies and analyses critical factors to increase citizens' use of e-services, although this is not exactly measuring adoption. It never mentions the city level and, in particular cities providing e-services. This survey has very little relevance to local e-government, beyond providing an understanding of the trends of e-government worldwide as a framework.

MeGAP: a US local public service benchmarking

An interesting methodology for benchmarking of local e-government is used by Kaylor et al. (2001) in "The e-Government Municipal Assessment Project". This pioneering study at the municipal level is probably the most interesting due to its "bottom-up" approach (i.e. it applies the analysis of the diversity and richness of services from local authorities to establish the benchmarking method). The benchmarking, conducted in year 2000, surveyed 38 mid-sized cities similar in population to Ann Arbor (Michigan, US), the city that commissioned the survey. With a pragmatic approach Kaylor et al. selected a palette of services that are performed by local administrations in the US. A total of 51 services were identified and grouped in 12 categories. Each service was evaluated using a four-level services sophistication assessment framework. At that point, Kaylor et al. defined a framework based on 4 levels. Although this framework does not differ substantially from the e-government models already discussed, it seems not to be based on them[3], which highlights its pioneering character. Once the service sophistication were assessed, the results were consolidated per category. The definition of services categories enabled the

3 But, were they existing? Kaylor's benchmarking was commissioned in June 2000 "*On June 19th 2000, the City Council of Ann Arbor (Michigan) passed a resolution authorizing the exploration of the possible expansion of the role of the Internet in providing city services*" (Kaylor et al., 2001). The benchmarking started in September 2000, which means that it is contemporary to the definition of first e-government models. The first one, the Baum and Di Mayo four phases e-government model, was published on November 21st of 2000, therefore Kaylor et al. actually started the benchmark before the publication of the first e-government model.

discussion of different degrees of sophistication per category and helped to identify some patterns among cities which were useful for making final recommendations. Finally, a summary statistic was defined to encapsulate all the results and was the base for a score used to rank cities.

This benchmarking method defined the methodology named MeGAP (The Municipal E-Government Assessment Project) as a benchmarking tool to assess the status of city/town e-government. The methodology was updated by the Public Sphere Information Group (PSI Group) in 2005 and it is currently in its third version (MeGAP-3). In this version, the catalogue contains 68 local services grouped in four categories (information dissemination, interactive functions, e-commerce functions and e-democracy). This methodology has been applied or partially applied in some other benchmarking surveys such as (Flak, Olsen, & Wolcott, 2005) in Norway with a sample of 30 municipalities and a palette of 68 local services, and (Arslan, 2007) in Turkey with a sample of 3,228 municipalities and a specific palette of 25 local services. Apart from this, it has been performed twice in United Sates cities by Public Sphere Information Group.

It is interesting to notice that during his research Kaylor et al. found a variety of services that were not anticipated. It was observed that quite a few cities had developed innovative and sophisticated functions online that were not reflected in the services catalogue used in the benchmarking survey. Nevertheless, the catalogue of services is closed (i.e. it does not allow the inclusion of new services) and MeGAP-3 categories are made mainly in terms of interactivity, therefore, they do not reflect thematic areas of services. The provision of a score hides important details in how a city is deploying e-government. And finally, it does not help to identify best practices, although it provides the ranking of cities according to the obtained score and a set of interesting conclusions based on the per category aggregated score.

E-Government at the American Grass-roots

"E-Government in the American Grass-roots" (Norris, 2005) is a work very quoted in e-local government literature. Norris examined in 2005 the average maturity of the e-government at local level and the likely future trajectory in the U.S. The Norris research is a secondary study based on the data provided by two surveys[4] conducted in 2000 and 2002 about local government adoption of e-government in the United States. The 2000 survey was mailed to 3,749 local governments obtaining 50.2% of responses. The 2002 survey included 7,844 local governments with 52.6% of responses. Norris complemented this information with a focus group of 40 local governments. It collected data to discover patterns in domestic adoption of e-government, (i.e. communication between the local public administration and American citizens). This study neither provides relevant information regarding electronic service provision, nor regarding the demand and their

4 The author used the data provided by the International City/County Management Association (ICMA) in their Local Government Survey performed in 2000 and 2002. (http://icma.org/en/press/home). ICMA is an organization of professional local government leaders building sustainable communities to improve lives worldwide. ICMA, provides member support; publications, data, and information. The Association is an internationally recognized publisher of information resources ranging from textbooks and survey data to topic-specific newsletters and e-publications.

adoption by the public. Although it was focused on local level, and mainly in electronic services provision, the study cannot be considered a benchmarking exercise.

Evolution of Local Government E-services in Australia

"The Evolution of Local Government e-Services" by Shackleton et al. (2004) presents a comparative evaluation of electronic services for 20 municipalities in the state of Victoria (Australia). The research was based on a benchmarking exercise mixed with a case study. The Municipal Association of Victoria identified 22 main functions or services undertaken by Australian municipalities (particularly those based in Victoria). The services were grouped in four categories: basic information, e-services, e-commerce and e-decision and e-democracy. The research started with a quantitative study of these 22 functions in the 20 local government websites. This study identified common features and provided some indication of maturity levels of those sites. As a second step, a case study was performed of the implementation of e-government services in one municipality (Shackleton et al., 2004). Again here, although the research was focused on local level, the first part consisted more of an official website benchmark than a benchmark of online services. As all the municipalities surveyed were placed in the same state sharing the same legal framework, is was easy to list the set of services to be evaluated. This model is not applicable at an international level. A second criticism is derived to the lack of a well referenced e-government model for services sophistication assessment.

2.7 Benchmarking local e-government services

Cities are important poles of human activity (cultural, intellectual and economic) that are gaining population and weight in the global economy at an impressive pace. They play a central and key role in e-government services provision by offering a rich variety of e-services, more than any other public administration. Nevertheless, benchmarking of local e-government services are scarce.

According to Cole and Parston (2006), the diversity in socio-economic environments and contexts make it difficult to compare performance across these institutions. United Nations Department of Economic and Social Affairs (UN, 2010) thinks that the different role cities play in different countries makes comparison difficult (i.e. a public function that is highly centralized in one country may be highly decentralized in other country). In addition, the UN states that the diversity in services and functions makes it even tougher for data collection and comparison. Collecting internationally comparable data at the local level – even where it exists – is especially difficult due to differences in political and economic systems. That context makes it quite difficult to perform any sound comparison taking a top-down approach (UN, 2010). Which is a fundamental characteristic that should be taken into account when designing a city e-government benchmarking to avoid misleading results (Bannister, 2007).

However, cities across the world are not comparable just because they are cities. At international level, the focus should be placed on benchmarking similar services delivered rather than similar organizations, as suggested by Jansen, de Vries and van Schaik (2010), because this is where, in the services provided, commonalities can be found. This approach is endorsed by research showing that cities around the world share an important number of common services. Indeed, a field research performed by Rodriguez, Batlle & Esteban (2007a) in seven major European cities revealed the existence of a panel of seventeen common services. A more recent research shows stronger evidence of commonalities in e-administration among cities at an international level (Gallego-Álvarez et al., 2010).

Therefore, international benchmarking of local e-government looks feasible taking the approach proposed by Jansen, de Vries and van Schaik (2010).

The construction of this set of services that will be the base for city e-administration comparisons is important and difficult, as it should include similar e-services, as well as the most important services of each city. It can be built following a bottom-up or top-down process. Examples of the latter are benchmarking methodologies that build the set of services from the legal framework that establishes which services a city administration should provide (Shackleton, Fisher & Dawson, 2004). This approach poses two problems. One is that those services, although mandatory, are usually not the most interesting for municipalities in the current e-government transformation and will be even less relevant in the near future (Löfstedt, 2007). Another issue is that cities cannot be compared at an international level with quite different legal frameworks, since the number of services to be compared is reduced with the consequent loss of interest.

According to the UN (2010), the bottom-up process appears to be the most suitable one, and it was done in the Municipal E-Government Assessment Project (Kaylor, Deshazo & Van Eck, 2001) introduced in the previous section. In this survey researchers performed a field research based on the actual service provision of cities, and identified the set of common services to be compared. From this first benchmarking, the authors defined a methodology called MeGAP-3 that has been applied with minor variations to a couple of other geographic regions, such as Norway (Flak, Olsen & Wolcott, 2005) and Turkey (Arslan, 2007).

The set of services can be built through field research, or through a participatory process involving the municipalities themselves. This last option ensures their interest in the benchmark because all the participants have been engaged in its design. Moreover, this approach is key to ensuring the usefulness of the results, which is still one of the main challenges when defining a methodology for local e-government benchmarking.

Cities are complex governmental agencies where an extensive variety of services is being provided. Most of them are not found at other levels of government, and therefore, introduce important special features and flavours to local e-government that requires a specific approach and methodology. However, general methodologies for e-government benchmarking cannot be applied to measuring and comparing the development of e-

government in cities. Cities deserve and need specific benchmarking methodologies that take account of the richness of the e-services provided.

2.8 Adoption of e-government services

Measuring adoption is important so as to get a complete view of the e-government service success. However, there is a clear lack of benchmarking surveys of e-government measuring the adoption of e-services. These two circumstances deserve a special section to better discuss the reason for the scarcity of benchmarking surveys measuring e-government services adoption.

Despite the focus on online services, nowadays, reports dealing with the provision and adoption of e-services are still scarce and use quite simplistic indicators (Jansen et al., 2010). The review of the existing e-government benchmarks shows that most of them focus on delivery of e-services (outputs, such as websites) and only few measure the use of the services (impact and outcomes) despite the fact that it has been time and again requested by scholars and international organisations (Janssen, 2003; Kunstelj & Vintar, 2004; Janssen et al., 2004; Heeks, 2006; Codagnone et al., 2006; Panopoulou et al., 2008; United Nations, 2010). Some of them and mainly the most recent ones including CapGemini Ernst & Young (2009), OECD (2011) and the United Nations (2010), stress the importance of adoption as a key component to assess e-government performance but did not measure it.

Panopoulou (2008) noted that current benchmarks only measure the “supply” side and not the use or take-up rate, that is the “demand” side, of e-services. This characteristic is encouraging countries to get good ratings for making lots of applications but not paying any attention to whether they are used by citizens or not. This attitude has been promoted, among others, by the yearly benchmarking of public services promoted by the European Commission and carried out by Cap Gemini. And this should be corrected more and more by the use of usage indicators and by weighing them together with output indicators.

Nowadays, the United Nations (2010) recognizes that most of the statistics are derived from supply-side indicators and often by website assessments alone. Little information is yet available on the demand-side of e-government. Few surveys exist that would indicate ‘how’ citizens use these services and ‘what’ they see as maximizing public value. (UN, 2010). Indeed, an OECD (2007) survey revealed that few of its countries had a concept of systematic monitoring and measuring focused on user take-up, the cities' situation being quite similar. More recently, the OECD (2009) still indicated that it was a new rising activity with limited experience and data.

The measurement of service adoption is important as has been stated by many authors. Kumar (2007) affirms that the ultimate objective of e-government programmes ought to be the frequent and recurring use of online services by citizens. Heeks (2006) states that matching e-government supply to demand is of paramount importance to managing change

in e-government programmes. Moreover, when delivering services through different channels, measuring and comparing adoption of electronic service between different channels is an important instrument for managing the shift towards cheaper channels (Janssen & Wagenaar, 2004). To measure the adoption and compare it with the provision of services is of paramount importance because only through this confrontation can the quality and the actual impact of the e-services be fully appreciated (OECD, 2009).

But, why are there no e-Government benchmarking surveys measuring provision and adoption of e-services at the same time?

The answer is that, still today, it is too difficult to measure the adoption of e-services. Many reasons can be found that make such measurements difficult, among them the lack of a consensus in a measurement framework, the inherent difficulties to define the users target, the variety of indicators needed and the existence of different practices to measure adoption. But let's analyse a bit more deeply each of these difficulties.

There is no shared framework to measure adoption, as there is for service maturity. Despite the existing research in service adoption, how to measure it still remains unattended. Löfstedt (2005) recognizes that there should be more research to elaborate models and methods to understand citizens adoption of e-services. The United Nations is claiming for an international consensus about how to assess e-government performance (UN, 2010), and that includes adoption.

The definition of the target of users for e-government services is a complex issue since each service has its specific target. In addition, the frequency of use of e-services modifies the adoption target. Bannister (2007) points out that most transactions with government occur once a year, many documents are renewed even less frequently and some others (bird certificates) are once in a lifetime events. Therefore, a case by case analysis of the different targets should be performed attending the social, cultural and technical context of use (Alshawy et al., 2007) (Patel & Jacobson, 2008) (Gilbert et al., 2004).

Several variables are needed to measure adoption, and there is no consensus on the set of variables to use. Janssen (2004) identifies: number of individuals/businesses that used electronic services, percentage of citizens that visited government websites to search for information, number of businesses that made payments online, and percentage of internet traffic that pertains to electronic service delivery as the main variables to measure. Nevertheless, Codagnone (2006) proposes a different set of web metrics to measure electronic services adoption: number of hits or user contact sessions, number of downloaded documents, amount of time users spend on a site, number of transactions completed, and web analytic (click streams, repeat use, cross-usage).

Services in different sophistications levels need different variables to measure adoption. When the number of visits or number of pages served are both indicators accepted to measure the use of informational services (stage 1), they are not appropriate to measure the real use of a transactional service (stage 3). Static and interaction levels especially offer

different modes of service with different levels of associated technology (Shareef, M.A., et al., 2011) and that implies the need for different variables to measure service adoption.

Finally, a variety of methodologies are used to assess adoption. Although surveys are the preferred source of information (Heeks 2006), Codagnone (2006) points out to the emerging use of web metrics/crawlers as an even richer source to assess service use in certain situations. This trend is supported in more recent publications (MV Consultoria, 2010). In addition, the introduction of the e-commerce concept of conversion rate to understand how effective the e-government solutions are, should be considered.

2.9 Measuring the impact of benchmarking e-government

As regards to the usefulness of e-government benchmarking, Janssen (2003) analysed two of the most important ones: CapGemini Ernst & Young (commissioned by the European Commission) and Accenture e-Government Benchmarking. Although the paper does not aim to measure their impact, the critique provides useful insights for increasing their quality and usefulness as, among others, including the demand side or take-up as a criterion for a successful e-government, taking into account the multichannel approach and not restricting to internet e-Government services, taking a citizen-centric logic instead of the point of view of the organisation, adapting the e-government maturity framework to include proactive services (zero interaction) or including services at regional and local level.

Heeks (2006) deals with the real use of e-government benchmarking data and concludes that, although there is an assumed use of such data to guide e-government strategy, there is a lack of evidence on the real impact of such comparative evaluations and the use of the data gathered. Bannister (2007) recognizes that e-government benchmarking can have a significant practical impact at a political level. However, he makes a deep discussion of the difficulties of carrying out rigorous and useful comparative evaluation in the e-government field, and most importantly, Bannister points out the unhealthy effects of repeating a survey such as CapGemini Ernst & Young. When repeating such evaluations organizations will often adapt their behaviour to what is being measured. Consequently, the organization undertaking the benchmark will design its e-government policy around scoring better instead of matching citizen needs. That is aligned with Janssen's (2003) observations that politicians too often develop their e-government policy based on the desire for a better ranking in the benchmarking index.

Schellong (2009) analysed CapGemini Ernst & Young, the United Nations and Brown University benchmarks to conclude that those benchmarks influence policy makers to make resource allocation decisions towards improving their countries ranking rather than investing in infrastructure, e-participation or other areas important to citizens.

2.10 Smart city and new trends in e-services

Nowadays cities are facing new challenges in the area of public services. The raising phenomenon of smart cities, an evolutionary concept of the “digital city” that takes its full dimension in urban areas, is a clear proof of the increasing complexity and relevance of the local e-Government.

Smart city is a term used since the late eighties, which became widespread in the past decade (Albino et al., 2015). The concept is developed in a time of crisis in the ICT sector, just after the burst of the dotcom bubble, and today does not have a definition having reached consensus (Caragliu et al., 2011; De Santis et al., 2014; Bowerman et al., 2000; Chourabi et al., 2012). And there are no examples worthy of imitation yet (Hollands, 2008).

Smart City was defined as a city where a new management based on advanced ICT infrastructures would maximize citizens' quality of life, economic prosperity, energy sustainability and respect for nature (Bowerman et al., 2000). This concept relies mainly on the appearance of new, multiple and diverse, cheaper sensors that provide substantial quantities of urban environment data, which could be useful to run a city. Most proponents of the concept depict it as a solution to current challenges: waste management, scarcity of resources, air pollution, human health concerns, traffic congestion, and inadequate, deteriorating and ageing infrastructures, including social ones. Cities label as *smart* the most innovative ways to manage these problems (Chourabi et al., 2013).

The main interest of the research are the smart city services. A smart city service is defined, perhaps too widely, as an innovative service using ICT in an urban habitat (Lee & Lee, 2014).

Thanks to the eruption of “internet of things” (sensors) and “big data” phenomena, cities are now facing the transformation of traditional urban services (e.g. waste collection, mobility, public transportation, pollution control). The availability of different kinds of electronic sensors and the analysis of the high volume of data provided by them, allow new approaches to change urban services provision, and at the same time, open up opportunities to keep citizens informed while making this information available for citizens to develop their own applications. This combination of technologies and resources will bring to the society a new generation of applications that will impact deeply the users' behaviours, mobility, sense of sustainability and relationships (Forest et al., 2009). Citizen-developed applications are an emerging trend around the world. These applications are improving urban living and demonstrating the real power of citizens engagement and creativity through ICT.

If benchmarking local e-government services is scarce in academic papers and surveys, the benchmarking of e-government services in a smart city context is even less so. A lot of literature can be found about cities and urban design, urban regeneration, growth, or even the impact of ICT in city governance, but no papers can be found regarding the facing of

the challenges of measuring and comparing the provision, adoption of electronic public services in the new scene of smart cities.

Caragliu (2009) exposes how the concept of smart city is related to some of the indicators used to measure regional and urban development in Europe. Academics are stating that the development of smart cities can improve the governance of the city, which means the process to include civil society as a key player in government processes (Odendaal, 2003). This increasing involvement of citizens in the city governance also has an impact in the delivery of public services. The Ubiquitous City, also named u-city, is a new city paradigm arising in Korea and Japan, it is characterized, among other features, by specific services, the so called u-services (Yigitcanlar, 2008). It is crucial that those services be always available, anytime and anywhere (Lee et al., 2010).

Nowadays, there is a lot more activity around this topic including quite a few emerging surveys aimed at ranking cities according to their "smartness", "intelligence" and sustainability. This follows the tradition of rankings cities in aspects such as quality of life, economic growth, attractiveness, business friendly, congresses and conventions, competitiveness, or prosperity to give some examples. Moonen, Clark and Feenan (2013) identified up to 150 different city indexes, benchmarks and comparative rankings. 26% of these indexes already existed in 2008. The sample ranges between 6 and 2,000 cities, with 20% performed on 20 or less cities.

Some of the existing surveys in the field of city smartness are quantitative and come from academia or economic research institutes. They are based on an aggregate index resulting from a multiplicity of indicators with arbitrary weights. A good example is the European Smart Cities Index (Giffinger et al., 2007) designed by 3 universities. This survey defines 6 areas (called characteristics) where cities could be "smart": economy, mobility, environment, people, living and governance. Measurements are performed along 74 indicators grouped in the 6 aforementioned characteristics. The Smart City Index was first used in a group of nearly 70 European medium-sized cities in 2007 (Giffinger et al., 2007).

The usefulness of rankings based on an aggregated index has often been criticized by the academia due to the difficulty of defining a well grounded methodology to arrive at such an index (Bannister, 2007). More recently, Rorissa, Demissie and Pardo (2011) highlight that the current procedures for computing e-government indices have significant limitations because they do not differentiate levels of e-government development or do not take account the nation dimension and level of development. These limitations are even more important in the case of smart cities where the definition of the concept is still not shared by the community (Santis 2013). Giffinger and Gudrun (2009) stated that those rankings are quantitative approaches that concentrate on issues which are measurable instead of the important ones. On the other hand, Kourtit, Macharis and Nijkamp (2014) recognize that, when ranking cities, any indicator list – extensive as it may be – will never be entirely complete and entirely fit-for-purpose. A further limitation comes from adapting the index to what is available in international city databases (e.g. Global Power City

Index). The rankings become tools for city marketing rather than being useful for improving e-government.

There are other smart city rankings which mainly come from economy/consulting-oriented companies, infrastructure providers, expert panels, private research institutes, or compiled by magazines or NGOs. These rankings rarely provide information about the selection of the sample, use a small number of indicators, lack transparency in the methodology for data gathering and index calculation method, as already criticized by Giffinger & Gudrun (2009). They do not provide well grounded insights for city managers, not to mention researchers.

But coming back to e-services, the current smart city context includes a myriad of so-called “apps” for smart-phones, some of which are new e-services, as they are tools to better perform everyday tasks in the urban environment. Empowered citizens and third sector appeared as new actors in the area of services of public interest and, a new form of production is expanding in quite an impressive way following the model of Commons Based Peer Production (Benkler, 2006).

The field of e-services is changing drastically, but so far, no benchmarks are paying attention to it. This new paradigm of content and services production seems to be providing promising avenues for evaluation and assessment of e-service. At the same time, if a new model of city growth and city management implies also a new generation of services, then, can we use the measurement of those services as a predictor of how smart a city is?

To answer that question, first of all a deep research in the field of smart city and u-city should be performed paying special attention to the new services that characterize this new city stage of growth. These new services should be catalogued and categorized first (Lee & Leem, 2006) to be subsequently analysed and compared with the previous existing ones to understand differences and similarities. A proposal for the classification of these new services is introduced by Lee & Lee (2014). This is an important step. Nevertheless, a framework of measurement should be developed to assess the maturity of these new services, and finally, a methodology to benchmark them, must be developed. This is a really new field in which methodologies are not yet in place.

3. The basis for a comparative evaluation of local e-government services

Before starting with the design of a methodology for benchmarking local e-government, it is worth analysing in deep the existing works in the field of comparative evaluation of e-government, and understanding why they cannot be used for benchmarking local e-government. This is done in (Batlle-Montserrat, Abadal & Blat, 2011). Moreover, as cities around the world are diversified in terms of geography, climatology, dimension, social aspects, politics, administrative organization and responsibilities, and many other aspects, researchers should ask themselves whether there is a basis for making comparative evaluation of e-government. Such a question is key, since a comparative evaluation requires the comparison of similar objects or entities. Therefore, some common characteristics should be found among cities before proceeding to benchmark them. Rodriguez, Batlle & Esteban (2007b) show that there is a basis for making such comparative evaluations if we focus on e-government services.

3.1 Limitations of the comparative evaluation of e-Government

"Local e-government benchmarking: limitations of comparative evaluation methods" (Batlle-Montserrat, Abadal & Blat, 2011) is an analysis of the state of the art in benchmarking e-government practices used from 2000 up to 2011 when in was performed.

The paper, first introduces the need to evaluate e-government project by making comparative evaluations as a best practice to manage its deployment correctly. The e-government models are introduced as frameworks that describe the level of maturity or sophistication of e-government projects. These e-government models are well accepted standards that contribute to making comparative evaluation possible. After that, different existing benchmarking and comparative evaluation studies are analysed from the city perspective.

The main findings are that a state or regional level benchmarking of e-government has no applicability to local public administration. The variety and characteristics of the services in cities are so different from those at the state or regional level, making the results of such benchmarking surveys of little use for cities. Only few methodologies have been designed to benchmark e-government at a city level, nevertheless, they do not measure the real usage or adoption of e-services. This lack of measures on the impact (usage) of the e-government policies reduces once again the value of the current benchmarking practices. These are two important limitations of the existing benchmarking.

The paper concludes with the need for designing specific methodologies for benchmarking e-government services in local public administrations taking into account the impact of

such services, since the existing ones do not provide useful information for city managers to manage their e-government agenda.

ARTÍCULOS

BENCHMARKING DEL E-GOBIERNO LOCAL: LIMITACIONES DE LOS MÉTODOS DE EVALUACIÓN COMPARATIVA

Joan Batlle-Montserrat, Ernest Abadal y Josep Blat

Joan Batlle-Montserrat es licenciado en ciencias físicas y máster en gestión de las tecnologías de la información. Responsable de cooperación internacional en e-gobierno e innovación en el *Ayuntamiento de Barcelona*. Actualmente está realizando el doctorado en información y documentación en la sociedad del conocimiento en la *Universitat de Barcelona* bajo la dirección de los profesores Abadal y Blat.

Ajuntament de Barcelona
jbatlle@ati.es

Ernest Abadal es catedrático de la *Facultat de Biblioteconomia i Documentació* de la *Universitat de Barcelona*. Licenciado en filosofía, diplomado en biblioteconomía y documentación y doctor en ciencias de la información. Dirige un proyecto de investigación sobre el acceso abierto a la ciencia en España y es director de la revista *BiD: textos universitaris de biblioteconomia i documentació*.

Universitat de Barcelona, Facultat de Biblioteconomia i Documentació
abadal@ub.edu

Josep Blat es catedrático de ciencias de la computación en la *Universitat Pompeu Fabra*, donde ha sido director del *Departamento de Tecnologías de la Información*. Licenciado en matemáticas por la *Universitat de València*, PhD (mathematics) por *Heriot-Watt University*, Edinburgh, y post-doc en *Université Paris-Dauphine*. Fue director del *Departamento de Matemáticas e Informática* de la *Universitat de les Illes Balears*, y dirige un grupo de investigación en tecnologías interactivas

Universitat Pompeu Fabra
josep.blat@upf.eduç

Resumen

Se introduce la necesidad de evaluar y comparar el desarrollo del e-gobierno y se analizan los instrumentos existentes. En primer lugar se presentan los modelos de evolución del e-gobierno actualmente en uso y se discuten sus características y utilidad. Un análisis de los estudios comparativos muestra el interés que despierta el área de administración electrónica. Seguidamente se analizan los estudios comparativos más relevantes sobre provisión electrónica de servicios públicos en la administración local. Ambos análisis ponen de manifiesto las limitaciones de los estudios existentes en su aplicabilidad en el ámbito local. Algunas son: la escasez de trabajos sobre administración local, la medida de la adopción de los servicios públicos, y el uso de modelos de evolución de e-gobierno que no reflejan las nuevas tendencias en prestación de servicios. Finalmente se señalan mejoras a realizar en futuras evaluaciones comparativas de servicios electrónicos para incrementar su aplicabilidad en la administración local.

Palabras clave

Gobierno electrónico, E-gobierno, Administración electrónica, Evaluación, Servicios electrónicos, Evaluación comparativa, Administración local.

Title: Local e-government benchmarking: limitations of comparative evaluation methods

Abstract

We present the need to evaluate and compare the development of e-government, and review benchmarking tools and practices. First we discuss the stages of e-government models that are currently in use and discuss the main characteristics and applications. The different e-government benchmarking approaches are analysed, pointing out that e-administration is the more benchmarked e-government area. A more in-depth analysis of the most relevant benchmarks is performed. Both

Artículo recibido el 20-02-11
Aceptación definitiva: 28-04-11

analyses reveal several limitations of existing studies with respect to applicability to local administration. These include the scarcity of studies focused on this area, the extent of adoption of public services and the use of models of evolution of e-government that do not reflect the new trends in the provision of services. Finally we point out improvements to be made in future benchmarking of electronic services to increase their applicability in the field of local administration.

Keywords

Electronic government, E-goverment, Electronic administration, E-administration, Evaluation, Electronic services, Benchmarking, Local administration.

Batlle-Montserrat, Joan; **Abadal, Ernest**; **Blat, Josep**. "*Benchmarking* del e-gobierno local: limitaciones de los sistemas de evaluación comparativa". *El profesional de la información*, 2011, mayo-junio, v. 20, n. 3, pp. 251-259.
DOI: 10.3145/epi.2011.may.02

Introducción

Según definición de la *OCDE*, gobierno electrónico o e-gobierno hace referencia al uso de las tecnologías de la información y las comunicaciones (TIC) por parte de los organismos públicos. Ha sido estudiado desde diversos puntos de vista: la preparación de las organizaciones públicas para asumirlo, la adopción interna de las nuevas tecnologías, los cambios organizativos que desencadena, la prestación de servicios públicos mediante las TIC, las claves para la participación ciudadana, la presencia en internet, etc.

En España por ejemplo la presencia de la Administración autonómica y local en internet ha sido objeto de estudio de diversos autores como **Muñoz-Cañavate** (2004, 2005), **Chaín-Navarro** (2004, 2008) o **Claver-Cortés** et al. (2008); se han analizado las características de las sedes web para la provisión de servicios electrónicos (**Lara-Navarra** y **Martínez-Usero**, 2003); se han estudiado aspectos relacionados con la adopción interna y el impacto organizativo (**Gascó**, 2003) o se han efectuado investigaciones más amplias sobre el e-gobierno (**Criado**, 2009), por señalar los más citados.

De todas las áreas de estudio nos interesa especialmente la evaluación. Como señala **Sancho** (2007), el uso de las TIC por la Administración tiene que medirse y especialmente cabe preguntarse qué mejoras y beneficios proporcionan a los servicios públicos que se prestan a la ciudadanía. La evaluación comparativa permite contrastar el progreso de una organización respecto a otras similares y tiene una aplicabilidad inmediata que la hace especialmente atractiva para las instituciones. Como veremos más adelante, la mayoría de los numerosos estudios sobre evaluación de e-gobierno publicados en el ámbito internacional se centran en la prestación de los servicios públicos electrónicos. Entre todos ellos destaca el de *Cap Gemini*, realizado por encargo de la Comisión Europea, que mide desde 2002 la disponibilidad en línea y el grado de sofisticación de 20 servicios electrónicos comunes en todos los estados de la Unión Europea.

En el ámbito local el e-gobierno adquiere su máxima dimensión y relevancia porque los ayuntamientos son las organizaciones públicas más cercanas a los ciudadanos y les proporcionan directamente más servicios que ninguna otra administración. En Europa y en los países desarrollados entre el 50 y el 80% de la interacción de los ciudadanos con los organismos públicos tiene lugar a nivel sub-nacional (**Moon**; **Norris**, 2005; **Heeks**, 2006). Por ello y por su cercanía (**Norris**, 2005), las actuaciones de los gobiernos locales afectan directamente a los ciudadanos, y esta proximidad a las personas hace que su papel sea también clave en la e-participación y la e-democracia (**Sakowicz**, 2003). Las administraciones públicas locales son el *front-end* de los servicios públicos en general y por lo tanto el principal punto de contacto para su prestación.

Además las ciudades y municipios desarrollan funciones relacionadas con la gestión urbana: organización del tráfico, transporte público, medio ambiente, limpieza, recolección de basura, alumbrado público, cultura, educación, asistencia social, control de la delincuencia, protección civil, etc. En algunos países las ciudades son responsables también de la prestación de servicios básicos como abastecimiento de agua, gas y electricidad. Todas estas funciones específicas no se encuentran en otros niveles de la Administración pública, y, por tanto, introducen unas características especiales al e-gobierno local.

> La evaluación comparativa permite contrastar el progreso de una organización respecto a otras similares

El repaso a la bibliografía nos muestra que a pesar de la abundancia de estudios de evaluación comparativa de e-gobierno, éstos se han centrado fundamentalmente en el estatal (**Sakowicz**, 2003; **Heeks**, 2006; **Lanvin**; **Lewin** 2006; **Löfstedt**, 2005) prestando poca atención al ámbito local. Por otro lado, muy pocos de ellos consideran el grado de adopción o uso real de los servicios por los ciudadanos, es decir, sólo se evalúa la oferta sin tener en cuenta la "compra" o el uso real de estos servicios por las personas como indicador de medida.

Este trabajo se propone los siguientes objetivos:

- Revisar ampliamente los principales estudios de evaluación comparativa en el campo específico de la provisión de servicios electrónicos.
- Señalar sus principales limitaciones, y especialmente desde la óptica de las administraciones locales, de cuyas características y funcionamiento de los servicios públicos electrónicos se tiene un conocimiento directo.

– Indicar mejoras a realizar en futuras metodologías de evaluación comparativa ajustada a las características del e-gobierno local.

> El e-gobierno abraza todas las actividades de la Administración pública

Gobierno electrónico y administración electrónica

Según la definición de la *OCDE* (2003), el gobierno electrónico o e-gobierno trata de la utilización de las TIC en las tareas y procesos de la Administración pública con el objetivo de cambiar la relación entre el gobierno y los ciudadanos, entre el gobierno y otras agencias gubernamentales, para la prestación de servicios públicos, para mejorar la eficiencia interna y para incrementar la participación de los ciudadanos.

Como vemos, abraza todas las actividades de la Administración pública y no está vinculado a una tecnología concreta, sino que las contempla todas. Esta definición tan amplia obliga a un análisis más detallado de las distintas áreas de aplicación de las TIC en los organismos públicos. Según **Janssen** (2003) dentro de e-gobierno se pueden identificar cinco grandes áreas:

– la provisión de soluciones TIC y el desarrollo de las capacidades de los ciudadanos para facilitar su inclusión en la sociedad de la información;
– las TIC aplicadas a la mejora de los procesos internos (incluyendo la re-ingeniería de procesos, y la mejora de la eficiencia);
– la provisión de los servicios públicos, es decir, proporcionar a los ciudadanos mejores servicios, de más calidad y de acceso más fácil con la ayuda de las TIC;
– las TIC para facilitar el acceso de los ciudadanos a la política permitiendo llevar a cabo un gobierno participativo (lo que se conoce como e-participación);
– el cambio en las relaciones entre los políticos y la Administración pública a su cargo causados por la introducción de las TIC, siendo los más significativos, según **Snellen** y **Donk** (1998), el de las prácticas de gestión pública y el de la estructura organizativa.

El aspecto específico de provisión de los servicios públicos, que conlleva interacción entre los ciudadanos/empresas y la Administración pública, es denominado por **Janssen** *electronic administration* o *e-administration*, término de uso común en el mundo anglosajón y que aquí traduciremos por administración electrónica o e-administración. Es uno de los componentes más importantes del e-gobierno, lo que ha provocado la confusión entre una parte y el todo, motivando que con cierta frecuencia se hable en España de e-administración refiriéndose a la totalidad del e-gobierno. La e-administración pretende proveer a los ciudadanos unos servicios públicos más eficaces y eficientes, unos servicios de mayor calidad y más fácil acceso. El estudio de la e-administración incluye aspectos como la adopción de los servicios en línea, la prestación de servicios multi-canal, la calidad del servicio o la satisfacción del usuario, pero deja fuera muchos otros aspectos del e-gobierno. En el mundo anglosajón ocurre lo contrario, ya que se usa con frecuencia el termino más general de e-gobierno cuando en muchas ocasiones debería usarse el más especifico de e-administración. A lo largo de este artículo encontraremos varios ejemplos.

> La e-administración es uno de los componentes más importantes del e-gobierno, lo que ha provocado la confusión entre una parte y el todo

Modelos de evolución del e-gobierno

Para la evaluación del e-gobierno se debe disponer de un marco de referencia. Los modelos de evolución basados en etapas tienen como objetivo delimitar el desarrollo de los sistemas de información en fases, caracterizadas por algún rasgo estructural, organizativo o funcional. Así, el desarrollo o evolución de los sistemas de información puede explicarse como el paso de una etapa a otra (**Andersen**; **Henriksen**, 2006), etapas que han sido ampliamente discutidas y aceptadas (**Janssen**; **Van Veenstra**, 2005). Estos modelos proporcionan un marco práctico, simple, comprensible y muy fácil de usar para medir la evolución y el progreso del e-gobierno (**Norris**, 2009).

Aunque los modelos de evolución por etapas fueron introducidos ya en la década de 1970 para el estudio del desarrollo y la organización de los sistemas de información en general, fue a finales de 2000 y principios de 2001 cuando aparecieron los modelos más importantes en el campo del e-gobierno. Entre éstos encontramos los de **Baum** y **Di Maio** (2000); **Layne** y **Lee** (2001), **Hiller** y **Belanger** (2001), **Wescott** (2001), que se apoyan en las características fácilmente visibles de los servicios de e-administración que una organización presta para indicar su estadio evolutivo en cuanto a la adopción interna del e-gobierno. Los dos primeros merecen un comentario más detallado.

La propuesta de **Baum** y **Di Maio**, conocida también como modelo de *Gartner*, es probablemente la más conocida y fue la primera en publicarse. Es un modelo de cuatro etapas que clasifica los proyectos de e-gobierno según las características de los servicios de e-administración que presta una organización.

– La primera etapa es la mera presencia en la Web, donde los gobiernos proporcionan información básica en línea, y la Web es usada como un elemento de comunicación pasivo.
– En la siguiente ya se ofrecen servicios con los que se puede interactuar de forma muy simple (realizar búsquedas, descargar formularios, enviar correos electrónicos...) con los gobiernos; estos servicios pueden ser dirigidos a los ciudadanos, a las empresas o a otros organismos públicos.
– En la tercera, la interacción es mas sofisticada y de tipo transaccional, es decir, completa y vinculante, y los ciudadanos pueden realizar "negocios" en línea con los gobiernos con lo cual se incluyen funcionalidades de au-

tenticación de usuario, transacciones seguras, pagos por Internet, etc.
– La etapa final implica una transformación completa de la relación entre gobierno y ciudadano, en la que éste se sitúa en el centro.

Desde la primera hasta la tercera etapa tenemos un proceso paulatino de digitalización de los servicios públicos, de traslado a la red sin afrontar grandes cambios organizativos. Sin embargo, en la cuarta etapa, los procesos internos asociados al servicio o servicios públicos que se trasladan a la red sufren una profunda transformación que afecta incluso a la forma de prestar estos servicios.

El modelo de **Layne** y **Lee** (2001), también de cuatro etapas, está orientado a describir los cambios que se producen en la organización en su evolución hacia una completa y total integración de funciones gracias a las TIC. En este caso las etapas son:

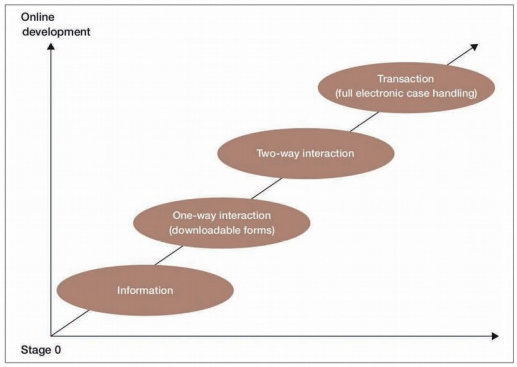
– catalogación, caracterizada por los esfuerzos de la organización en disponer de presencia web;
– transacción, etapa en la que los esfuerzos se dirigen a la conexión de los sistemas de información con los interfaces en línea contenidos en el sitio web corporativo;
– integración vertical, en la que se conectan los sistemas de información con los de otras organizaciones permitiendo la realización de operaciones entre distintas organizaciones gubernamentales; y
– integración horizontal, en la que se rompen los silos de la propia organización, se tiene acceso a varios sistemas de información y se habilitan transacciones múltiples que permiten el desarrollo de interacciones integradas que conllevan niveles superiores de simplificación en la interacción con la administración pública.

Pese a la existencia de estos modelos de etapas, la *Comisión Europea* optó por uno nuevo para sus evaluaciones comparativas o *benchmarkings* de e-gobierno en Europa (*Cap Gemini*, 2002-2006). Este modelo está completamente orientado a la medida de la sofisticación de los servicios electrónicos ofrecidos por una organización pública, consta también de cuatro niveles de sofisticación y se ha convertido en un estándar de facto.

Los cuatro niveles son:

– "T1 Información en línea" acerca de los servicios públicos;
– "T2 Interacción", que habilita la descarga de formularios;
– "T3 Comunicación bidireccional", que introduce el procesamiento de formularios y la autenticación (aunque la petición y los datos quedan en manos de la administración que ejecutará los procesos internos necesarios para realizar el servicio o trámite solicitado); y
– "T4 Transacción", con tramitación de los casos, decisión y entrega incluyendo pago (si es necesario), y donde la ejecución de los procesos se desencadena por la petición del ciudadano y conlleva la entrega electrónica de los resultados al mismo.

El modelo de *Cap Gemini* es el más adecuado para la evaluación de servicios electrónicos: fue diseñado para este propósito, con etapas fácilmente reconocibles en los e-servicios, y dispone de mayor granularidad que otros ya



Modelo de *benchmarking* de e-gobierno en Europa de *Cap Gemini*. Fuente: *Cap Gemini*, 2006.

que usa cuatro etapas para alcanzar el nivel de transacción, mientras que **Baum** y **Di Maio** sólo usan tres, y **Layne** y **Lee** dos.

Estos modelos, definidos hace ya 10 años, no preveían estadios evolutivos avanzados de la e-administración como la pro-actividad, la simplificación de servicios, o la integración, que conllevan la supresión de algunos servicios (**Janssen**, 2003; **Kunstelj**; **Vintar**, 2004) ni tampoco la interacción o la prestación de servicios participativa usando tecnologías web 2.0 cada vez más adoptada por las administraciones locales. Para paliar este problema, éstos han sido actualizados con la inclusión de niveles adicionales. Por ejemplo *Cap Gemini* añadió en 2007 un quinto nivel llamado "personalización" que refleja la prestación de servicios pro-activos y automáticos, sin necesidad de que el usuario solicite el servicio (*Cap Gemini*, 2007, 2009), olvidando sin embargo el uso de tecnologías web 2.0. Si bien estos modelos de evolución proporcionan un marco de medida universal indiscutible sobre el cual poder evaluar el estado del e-gobierno en distintas organizaciones, deben mantenerse actualizados.

> El modelo de *Cap Gemini* es el más adecuado para la evaluación de servicios electrónicos, y dispone de mayor granularidad que otros

Benchmarking de e-gobierno

La evaluación comparativa o *benchmarking* es una práctica extendida en el área de marketing y ventas. Aplicarla al e-gobierno significa llevar a cabo una revisión comparativa del progreso de las organizaciones en su implantación o despliegue (**Heeks**, 2006). En primer lugar veremos su relevancia práctica en los procesos de implantación de servicios electrónicos, analizaremos luego el conjunto de estudios comparativos realizados en e-gobierno, para concluir revisando los estudios más relevantes en el ámbito de la administración local.

La implantación del e-gobierno es un proceso de cambio que necesita ser planificado y administrado cuidadosamente por los responsables políticos y gestores públicos para reducir su duración y alcanzar los objetivos perseguidos. Uno de los instrumentos clave para este cometido es, según

Kunstelj y **Vintar** (2004), la evaluación comparativa, pues permite conocer el nivel actual de desarrollo, averiguar en qué medida los objetivos se han alcanzado, validar la eficacia de las estrategias y planes de acción, determinar las fortalezas y debilidades de éstos, y encontrar ejemplos de buenas prácticas.

Kunstelj y **Vintar** realizaron en 2004 un estudio sistemático de los *benchmarking* de e-gobierno existentes hasta la fecha y contabilizaron un total de 40 estudios comparativos. De éstos, 14 se centraban en aspectos de *e-readiness* o grado de adopción interna de las TIC por parte del organismo público, 15 evaluaban la *e-readiness* de los ciudadanos y las empresas (grado de uso de las TIC por parte de esos colectivos), sólo 2 tenían los procesos internos de la administración (*back-office*) como foco principal (aunque otros 4 lo incluyeron de alguna manera); 26 estaban centrados en la provisión de servicios electrónicos, 14 trataban su adopción por parte de los ciudadanos y empresas, pero solo 3 confrontaban la oferta y la demanda de servicios en línea; 4 se centraban en el impacto o beneficios del e-gobierno, que era un asunto complementario en otros 6. Nótese que un *benchmarking* concreto puede abordar más de una dimensión de las que hemos señalado.

Dos años después **Codagnone** et al. (2006) llevan a cabo una revisión y actualización del estudio de **Kunstelj** y **Vintar**, presentando una lista de 64 *benchmarkings* agrupados en cuatro categorías: *e-readiness*, oferta o prestación de servicios públicos electrónicos, demanda, e impacto. Se constata que la situación no había cambiado de forma significativa. La inmensa mayoría se centraban en la oferta (número de servicios disponibles en línea) o en *e-readiness*; y se detectó un aumento, todavía limitado, de los que estudiaban la demanda o adopción de los servicios electrónicos, es decir, aceptación y satisfacción con los servicios por parte de sus usuarios.

En ambos estudios se identificó el área de e-administración, es decir la provisión de servicios electrónicos y la web oficial, como la más rica en evaluaciones comparativas, lo que es razonable, ya que el *front-end* es la parte más visible de la Administración pública en internet (**Janssen**, 2003) y por lo tanto la que suscita mayor interés. Además, como hemos podido ya comprobar, los modelos de evolución antes mencionados también fueron orientados hacia esta parte del e-gobierno lo que facilitó el establecimiento de un marco de referencia y una metodologia de evaluación comparativa ampliamente compartidos. La e-administración es también el área del e-gobierno en la que centraremos más nuestra atención a partir de ahora, y lo haremos desde la perspectiva del gobierno local.

Limitaciones de los *benchmarking* de e-administración para la administración local

A pesar de la creciente importancia de los gobiernos locales, ésto no se traduce en la realización de más estudios, sino todo lo contrario (**Wohlers**, 2007). Hasta la fecha, la mayoría se han centrado en el e-gobierno estatal y se ha prestado poca atención a las administraciones públicas sub-nacionales, incluyendo las ciudades, como señalan varios investigadores (**Sakowicz**, 2003; **Heeks**, 2006; **Lanvin**; **Lewin**, 2006; **Löfstedt**, 2005). La escasez de trabajos locales es la primera limitación.

Desde la óptica de la administración local los estudios comparativos a nivel estatal o regional carecen de valor puesto que se basan en el análisis de funciones no específicas de las ciudades o gobiernos locales, y no se dirigen a las que se desarrollan a nivel local. En general, los servicios a nivel local serán distintos y mucho más variados que los de las organizaciones gubernamentales a nivel estatal o regional. Para llevar a cabo un estudio comparativo de e-administración entre gobiernos locales se debe establecer una base común de servicios que permita la comparación.

> La mayoría de estudios se han centrado en el e-gobierno estatal y se ha prestado poca atención a las administraciones públicas sub-nacionales, incluyendo las ciudades

Si además se analizan los estudios existentes desde el punto de vista de la e-administración, éstos aportan una información incompleta puesto que no contemplan estadios avanzados de e-administración, no miden la adopción de los servicios por parte de sus usuarios y no contemplan la diversidad de canales usados para la prestación de éstos. Para ilustrar los dos últimos aspectos de esta afirmación, analizamos a continuación los cinco *benchmarkings* más significativos para nuestra investigación.

Comencemos por el análisis de la familia de *benchmarkings* de *Cap Gemini*, *Online availability of public services*, encargados por la *Comisión Europea* desde 2002 y realizados hasta 2009, que son probablemente los más importantes en su género.

Ya hemos señalado antes la importancia del modelo de evolución por etapas para evaluar la madurez de los servicios públicos en el que se basan los *benchmarkings*; remarque-

Ciudadanos	Empresas
Impuesto sobre la renta de personas físicas	Seguridad social empleados
Búsqueda de empleo	Declaración de impuesto de sociedades
Seguridad social	Declaración de IVA
Documentos de identidad	Registro de nueva sociedad
Matriculación de vehículos	Envío de datos estadísticos
Licencias de construcción	Declaración de aduanas
Denuncias policía	Permisos medioambientales
Bibliotecas	**Compra pública**
Certificados de nacimiento y matrimonio	
Matriculación universidad	
Cambio de domicilio	
Servicios sanitarios	

Tabla 1. Servicios públicos de los *benchmarkings Cap Gemini*; en **azul** los ofrecidos por la administración local en España

mos también que han definido un conjunto de servicios básicos a evaluar, que se reflejan en la tabla 1. Su metodología y resultados han sido ampliamente analizados y discutidos por muchos autores (**Janssen**, 2003; **Bannister**, 2007; **Heeks**, 2006). Sin embargo es necesario destacar además que se centran sólo en la prestación de los servicios sin ofrecer datos sobre su adopción, y que se llevan a cabo a nivel estatal y no tienen aplicabilidad a nivel local. Por ejemplo, en el caso de España sólo 4 de los 20 servicios considerados se prestan a nivel local, que se reflejan en la tabla 1 en negrita azul. Esta familia de *benchmarkings* es tan importante como paradigmática de los numerosos estudios a nivel estatal o regional, de forma que no analizaremos otros, y pasamos ya al análisis de los locales.

Una interesante metodología de evaluación comparativa de la e-administración local es la utilizada por **Kaylor** et al. (2001) en *The municipal e-government assesment project* (*MeGAP*). Este estudio pionero en el ámbito municipal es al mismo tiempo el más interesante en nuestra opinión, ya que la metodología tiene un enfoque *bottom-up*, es decir, parte del análisis de la diversidad y riqueza de los servicios prestados desde las administraciones locales para establecer el método de evaluación comparativa que luego aplica. El estudio se centra en un conjunto de ciudades norteamericanas, y analiza los servicios electrónicos que suministran, realizando una comparativa. Las principales limitaciones son la no evaluación de la adopción de los servicios y la falta de una selección de buenas prácticas que facilite el proceso de desarrollo de la e-administración municipal mediante su imitación. Otros estudios municipales en ámbitos geográficos diferentes: 3.228 municipios de Turquía (**Arslan**, 2007), 30 ciudades de dos regiones de Noruega (**Flak** et al., 2005) y 24 ciudades de Suecia (**Löfstedt**, 2007) usan la misma metodología, lo que prueba en cierta forma el acierto de su enfoque para la administración pública local.

The evolution of local government e-services, realizado por **Shackleton** et al. (2004), presenta una evaluación comparativa de los servicios electrónicos prestados por 20 ayuntamientos del estado de Victoria (Australia). El estudio define un conjunto de 22 servicios comunes que las ciudades proporcionan a sus ciudadanos, sobre cuya base hace una interesante evaluación comparativa de la prestación y madurez de los mismos. Este último aspecto es relativamente novedoso; la metodología no es *bottom-up* y, una vez más, se ignora la adopción.

E-government in the American grass-roots (**Norris**, 2005), un trabajo muy citado en e-gobierno local, es un estudio secundario basado en dos encuestas realizadas con anterioridad (en 2000 y 2002). En él se analizan los datos recogidos para descubrir patrones en la adopción interna, es decir, por parte de la administración, del canal web para la comunicación entre la administración pública local norteamericana y sus ciudadanos. Este estudio no aporta información relevante en cuanto a servicios electrónicos (e-administración), ni tampoco sobre la demanda ni la adopción de éstos por parte de la ciudadanía.

Estas mismas limitaciones se aplican al benchmark *Digital governance in municipalities worldwide* diseñado por **Holzer** y **Kim** en 2003 y repetido en varias ocasiones, que es aún más conocido. Se trata de un estudio comparativo de las ciudades que son capitales de estado y se basa en el análisis de los sitios web oficiales, y cuya metodología se ha convertido en la oficial de Naciones Unidas para medir y comparar la evolución del e-gobierno en las principales ciudades del mundo. A pesar de ser un estudio de gran valor y transcendencia, éste, como muchos otros estudios que analizan el *front-end*, se centra solo en el canal web. Aunque éste sea el canal de distribución más utilizado, considerarlo como único medio para la prestación de servicios de e-gobierno proporciona información incompleta (**Janssen**, 2003).

Así pues, cuando se evalúan los servicios electrónicos debemos tener en cuenta todos los canales digitales utilizados para prestar estos servicios, incluyendo el uso de quioscos, televisión digital, dispositivos móviles y otros que puedan aparecer. Y por otro lado, la evaluación tendría que incluir estadios más avanzados de evolución, a los que ya se ha llegado, y que no estaban contemplados en los modelos que ya hemos analizado.

Pero antes de cerrar este apartado, volvamos al catálogo de e-servicios locales que sería importante utilizar como base de la evaluación comparativa. Ya hemos señalado que la propuesta existente más razonable, la de **Kaylor** es de 2001, y se centra en los EUA. Diez años más tarde, y teniendo en cuenta la especificidad europea, y la variedad de las administraciones locales dentro de esta especificidad, pensamos que un *benchmarking* local europeo necesita una nueva aproximación *bottom-up* europea que cree este catálogo común sobre el que evaluar.

> “La medición de la adopción es una de las mayores carencias de los estudios de e-administración”

Mejorar la utilidad de las evaluaciones comparativas

Pasando de las limitaciones de los *benchmarkings* que hemos puesto de manifiesto a posibles oportunidades de mejora, hay tres aspectos que los nuevos *benchmarkings* locales podrían contener.

El primero es subsanar los problemas ligados a la traducción habitual de los *benchmarkings* en clasificaciones o rankings globales. Esto introduce unos aspectos innecesariamente competitivos donde el foco de las instituciones se centra en mejorar la clasificación propia, con medidas de cara a la galería y no necesariamente ligadas al progreso objetivo en los servicios a los ciudadanos. Es por ello que sugerimos introducir indicadores de autoevaluación, como por ejemplo, presentando los resultados de cada administración, local en nuestro caso, comparados con la media, y ello respecto a cada temática, como por ejemplo, madurez en el suministro de cada e-servicio concreto o bloque de e-servicios, o como medida de adopción ciudadana de un e-servicio concreto; o indicadores de resumen de estas comparativas. Pensamos que esto facilita ejercitar la autoevaluación de forma detallada y estimula la adopción de buenas prácticas y no los

aspectos competitivos distorsionadores ligados a las clasificaciones globales resumidas. La identificación de buenas prácticas, específicas, se basa en la identificación de las instituciones que se sitúan por encima de la media de forma destacada.

> El uso real es un claro indicador de éxito en el despliegue de una estrategia de e-gobierno

El segundo aspecto es la mejora en las visualizaciones de los indicadores. Con ello, los gestores y los políticos de las administraciones locales pueden comprender mejor la situación de sus administraciones, o la situación de administraciones que sería conveniente seguir, y ello redundaría en alcanzar uno de los objetivos de la evaluación comparativa local, que sea útil para la mejora del e-gobierno.

Finalmente, la medida de la adopción es una de las carencias que con más frecuencia presentan los estudios de e-administración. La importancia de medir la adopción ha sido reconocida por muchos académicos (**Kumar** et al, 2007; **Janssen**; **Wagenaar**, 2004). El uso real es un claro indicador de éxito en el despliegue de una estrategia de e-administración. Las razones de esta carencia son diversas y no nos extenderemos en su análisis: no existe un consenso en los indicadores a usar (*ONU*, 2010), hay dificultades para definir el publico objetivo de cada e-servicio, falta un marco consensuado de medición de adopción... De todas formas, sigue siendo de suma importancia medir la adopción y, además, confrontarla con la provisión de servicios. Solo a través de esta confrontación podremos apreciar la calidad y el impacto real de los e-servicios ofrecidos.

Conclusiones y reflexiones finales

En esta revisión hemos comenzado por clarificar los conceptos más básicos de e-gobierno –introducción de TIC en la administración– y de e-administración –los servicios públicos a los ciudadanos en el e-gobierno–, y describir los múltiples aspectos del e-gobierno. Hemos señalado la importancia de su medición, particularizando en uno de los sistemas más empleados, la evaluación comparativa o *benchmarking*, y hemos visto como la metodología se basa fundamentalmente en modelos de evolución por etapas de introducción de las TIC, y que lo que se evalúa y compara por tanto son las etapas en que se encuentran los diferentes aspectos a analizar.

Nuestro interés está en la evaluación comparativa local, donde existen sorprendentemente muy pocos estudios. A través de la revisión bibliográfica y nuestra propia experiencia en esta administración, hemos puesto de manifiesto la escasa utilidad de los *benchmarkings* de ámbito estatal o regional para el análisis de la administración local, así como sus limitaciones metodológicas, incluyendo en esta crítica a los pocos que existen de ámbito local.

Una buena medición de e-gobierno local ha de cubrir la amplitud y variedad de servicios y tareas (gestión de tráfico, de residuos...) que desempeña la administración de este ámbito; ha de medir tanto la oferta de servicios como la adopción por los ciudadanos; ha de contemplar tanto el canal web como los numerosos nuevos canales digitales de provisión que van apareciendo; ha de utilizar modelos evolutivos que incluyan los significativos cambios en las TIC que están apareciendo.

Sin volver a entrar en detalles, nos permitimos mencionar el papel capital que jugará en esta evaluación comparativa un buen catálogo de servicios locales actualizado a nivel europeo, desarrollado *bottom-up*. Y por otro lado, que las limitaciones actuales provienen de dificultades objetivas, como por ejemplo las de medir la adopción, o contemplar la rica variedad de situaciones en la administración local.

> Una buena medición de e-gobierno local ha de contemplar tanto el canal web como los nuevos canales digitales que van apareciendo

Este último punto nos lleva a una pequeña reflexión: hemos señalado que e-administración sólo es una parte del e-gobierno (aunque muy importante) y parece que volvemos a caer en esta revisión en centrarnos en esta parte y no en el todo. La razón de fondo, aparte de su importancia indudable, es que la mayoría de lo que se ha hecho en evaluación comparativa ha sido relacionado con e-administración, y esta revisión por tanto no puede obviarlo. En todo caso, se necesita mejorar la evaluación comparativa de la e-administración local, a la que se ha prestado escasa atención.

Finalmente señalemos que es importante innovar en indicadores de autoevaluación, así como en indicadores finales menos competitivos y sumarios, para que realmente la evaluación comparativa sirva para la identificación y extensión de las buenas prácticas de e-administración o e-gobierno a nivel local.

Bibliografía

Andersen, Kim Viborg; **Henriksen, Helle Zinner**. "E-government maturity models: extension of the Layne and Lee model". *Government information quarterly*, 2006, v. 23, n. 2, p. 236.

Bannister, Frank. "The curse of the benchmark: an assessment of the validity and value of e-government comparisons. *Intl review of administrative sciences*, 2007, v. 73, n. 2, p. 171.

Batlle-Montserrat, Joan; **Calderón, Raquel**; **López, Júlia**. *Local e-government bench-learning survey*. Brussels: Eurocities, 2009.

Baum, Christopher H.; **Di Maio, Andrea**. *Gartner's four phases of e-government model*. Gartner Group, 2000, 21.

Cap Gemini. Online availability of public services. Brussels: European Commission, 2002-2006.

Cap Gemini. Benchmarking the supply of online public services. 7th measurement. Brussels: European Commission, 2007.

Cap Gemini. Smarter, faster, better eGovernment. 8th eGovernment benchmark measurement. Brussels: European Commission, 2009.

Claver-Cortés, Enrique; **De-Juana-Espinosa, Susana**; **Tari, Juan-José**. "E-government maturity at Spanish local levels". *Intl journal of value chain management*, 2008, v. 2, n. 1, pp. 4-17.

Chaín-Navarro, Celia; **Muñoz-Cañavate, Antonio**. "La administración local española en internet: estudio cuantitativo de la evolución de los sistemas de información webs de los ayuntamientos (1997-2002)". *Ciencias de la información*, 2004, v. 35, n. 1, pp. 43-55.
http://cinfo.idict.cu/index.php/cinfo/article/view/225/207

Chaín-Navarro, Celia; **Muñoz-Cañavate, Antonio**; **Mas-Bleda, Amalia**. "La gestión de información en las sedes web de los ayuntamientos españoles". *Revista española de documentación científica*, 2008, octubre-diciembre, v. 31, n. 4, pp. 612-638.
http://redc.revistas.csic.es/index.php/redc/article/viewArticle/446

Codagnone, Cristiano; **Caldarelli, Luca M.**; **Cilli, Valentina**; **Galasso, Giovanna**; **Zanchi, Fiorenza**. *Compendium to the measurement framework. eGovernment economics project*. Rome: eGEP Consortium, 2006.

Criado, J.-Ignacio. *Nuevos enfoques en el estudio de la administración electrónica. Neoinstitucionalismo y tecnologías de información y comunicación e internet en las administraciones públicas*. 2009.

Gascó, Mila. "New technologies and institutional change in public administration". *Social science computer review*, 2003, v. 21, n. 1, p. 6.

Heeks, Richard. "Understanding and measuring egovernment: international benchmarking studies". En: *Undesa workshop e-participation and e-government: understanding the present and creating the future*, Budapest, 2006, pp. 27-28.

Hiller, Janine S.; **Belanger, France**. "Privacy strategies for electronic government". *E-government*, 2001, pp. 162-198.
http://www.businessofgovernment.org/sites/default/files/PrivacyStrategies.pdf

Holzer, Marc; **Kim, Seang-Tae**. *Digital governance in municipalities worldwide: an assessment of municipal web sites throughout the world*. Newark (New Jersey): The E-Governance Institute. Rutgers University, 2003.

Janssen, Davy. "Mine's bigger than yours: assessing international e-government benchmarking". En: *3rd European conf on e-government, MCIL,* Reading, MA, 2003, pp. 209-218.

Janssen, Marijn; **Van Veenstra, Anne-Fleur**. "Stages of growth in e-government: an architectural approach". *Electronic journal of e-government*, 2005

Janssen, Marijn; **Wagenaar, René**. "An analysis of a shared services centre in e-government". En: *37th Annual Hawaii intl conf on system sciences*, Hawaii, 2004.

Kaylor, Charles; **Deshazo, Randy**; **Van Eck, David**. "Gauging e-government: a report on implementing services among American cities". *Government information quarterly*, 2001, v. 18, n. 4, pp. 293-307.
http://www.bgrazvitie.net/bg/159/Gauging-eGov(GIQ).pdf

Kunstelj, Mateja; **Vintar, Mirko**. "Evaluating the progress of e-government development: a critical analysis". *Information polity*, 2004, v. 9, n. 3-4, p. 131-148.

Lanvin, Bruno; **Lewin, Anat**. "The next frontier of e-government: local governments may hold the keys to global competition". *Global information technology report*, 2007, pp. 51–63.

Lara-Navarra, Pablo; **Martínez-Usero, José-Ángel**. "Desarrollo de sitios web para la oferta de servicios característicos de la administración electrónica". *El profesional de la información*, 2003, mayo-junio, v. 12, n. 3, pp. 190-199.
http://www.elprofesionaldelainformacion.com/contenidos/2003/mayo/2.pdf

Layne, Karen; **Lee, Jungwoo**. "Developing fully functional e-government: a four stage model". *Government information quarterly*, 2001, v. 18, n. 2, pp. 122-136.

Löfstedt, Ulrica. "E-government – assessment of current research and some proposals for future directions". *Intl journal of public information systems*, 2005, v. 1, n. 1, pp. 39-52.

Löfstedt, Ulrica. "E-government services in local governments: a study of development in Swedish municipalities". *Journal of organisational transformation and social change*, 2007, v. 4, n. 2, pp. 157-176.

Muñoz-Cañavate, Antonio; **Chain-Navarro, Celia**. "The world wide web as an information system in Spain's regional administrations (1997-2000)". *Government information quarterly*, 2004, v. 2, n. 2, pp. 199-218.

Muñoz-Cañavate, Antonio. "El web en la administración local española. Conclusiones de seis años de estudio". En: *IX Jornadas españolas de documentación*. Madrid, 2005, pp. 371-392.

Norris, Donald F. "E-government among American local governments: adoption, impacts, barriers and lessons learned". En: *The intl conf for administrative development: towards excellence in public sector performance*, Riyadh, Saudi Arabia, 2009.

Norris, Donald F.; **Moon, Jae**. "Advancing e-government at the grassroots: tortoise or hare". *Public administration review,* 2005, v. 65, n. 1, pp. 64-75.

Norris, Donald F. "E-government at the American grassroots: future trajectory". En: *38th Annual Hawaii intl conf on system sciences,* 2005 (*Hicss'05*), Hawaii, p. 125b.

OCDE. The e-government imperative: main findings, 2003.

Sancho-Royo, David. "Estrategias de evaluación de iniciativas de administración electrónica". *Administración & ciudadanía*, 2007, v. 2, n. 3, p. 199.

Sakowicz, Marcin. "How to evaluate e-government? different methodologies and methodes". En: *11th NISPAcee annual conf*, 2003.

Shackleton, Peter; **Fisher, Julie**; **Dawson, Linda**. "Evolution of local government e-services: the applicability of e-busi-

ness maturity models". En: *37th Annual Hawaii intl conf on system sciences,* Hawaii, 2004, p. 5.

Snellen, Ignace Th. M.; van de Donk, Wim B. H. J. *Public administration in an information age: a handbook.* Amsterdam: Ios Press, 1998.

United Nations. *E-government survey 2010. Leveraging e-government at a time of financial and economic crisis*, No. ST/ESA/PAD/SER.E/131. New York: United Nations, 2010.

Wescott, Clay G. "E-government in the Asia-Pacific region". *Asian journal of political science*, 2001, v. 9, n. 2, pp. 1-24.

Wohlers, Tony E. "E-government: trends and sophistication at the local level of government". En: *Annual meeting of the Midwest Political Science Association,* Palmer House Hotel, Chicago, IL, 2007.

3.2 Study of e-government at European local level

"European Study of e-Government City Models" (Rodriguez, Batlle & Esteban, 2007b) is a paper that presents a research (Rodriguez, Batlle, & Esteban, 2007a) carried out in 2006 in 7 major European cities that are widely recognized for their e-government strategy. These cities are: Barcelona, Vienna, Munich, Birmingham, Stockholm, The Hague and Turin. The research uses qualitative techniques based on case studies and interviews for identifying and describing successful examples of city e-government. It analyses the underlying models followed by these cities to deploy e-government, and identifies the main common characteristics among these successful cases.

From the perspective of electronic services, the relevant contributions of the research are twofold. The first contribution is that all cities focus their e-government strategy on providing services that match a large demand and attract a critical mass of users or "high-impact services" in the public space. These services are important for facilitating a rapid adoption of e-government services and, therefore, shift public interest and habits towards the usage of the city e-services. This approach comes up with a list of popular high impact services, that most advanced cities offer covering 50% to 80% of the whole potential volume of transactions. The evidence of the existence of a corpus of common services is of capital importance when designing a benchmarking methodology. The second, is that adoption is fully recognized as one of the main tests for successful e-government programmes.

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

REVIEW

European Study of E-government City Models

José Ramón Rodríguez Bermúdez
Joan Batlle Montserrat
David Esteban Ayerbe

Submission date: May 2007
Acceptation date: June 2007
Published in: September 2007

Abstract
Barcelona city council, in collaboration with "Eurocities" - the network of European cities, has published a study about e-Government in the local world. A review is made and the conclusions are presented. The study includes an in-depth analysis of seven major cities that deployed e-Government programmes successfully (Barcelona, Birmingham, Munich, Stockholm, The Hague, Turin and Vienna) and a live call with the senior executives in charge of the program in each city. The supply and demand of e-services are analyzed, along with the factors that promote and condition their implantation in the local world and, probably, in other Public Administrations.

Keywords
e-government, e-administration, e-services, ICT, economic and social sustainability

Topic
E-Government

Estudio europeo sobre e-gobierno en las ciudades

Resumen
Se hace una reseña y se presentan las conclusiones del estudio sobre e-gobierno en el mundo local, que ha publicado el Ayuntamiento de Barcelona en colaboración con la red europea de ciudades «Eurocities». El estudio incluye un análisis en profundidad de siete ciudades que han tenido éxito en la implantación de programas de e-gobierno (Barcelona, Birmingham, Munich, Estocolmo, La Haya, Turín y Viena) y una entrevista con sus responsables de organización y sistemas de información o de su programa de administración electrónica. Se analizan la oferta y la demanda de e-servicios y los factores que impulsan y condicionan la implantación en el mundo local y, probablemente, también en otras administraciones públicas.

Palabras clave
e-gobierno, administración electrónica, e-servicios, TIC, sostenibilidad social y económica

Tema
Gobierno electrónico

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

Barcelona city council, in collaboration with "Eurocities" - the network of European cities, has published a study about e-Government in the local world. In the following pages a review is made and the conclusions are presented.

This report is part of the work done by the eGovernment working group from the Eurocities Forum on the Information and Knowledge Society (Telecities), led by the city of Barcelona, from January 2006 to March 2007. The goal of the group was to identify good practices and trends in eGovernment programs being run by the city members of the Forum.

Yearly, many surveys, articles, websites and conferences provide information and analysis about plans, pilot projects or innovations in which many European cities are taking part. The group took a different view, focusing on how the cities are delivering actual eGovernment programs to their residents, tourists and investors and how they manage and deploy these projects in their real lives.

So the focus was on how cities provide an advanced level of complete transactional eServices (not mere information and communication websites), through city or council wide programs (not just for a function or department) that are reasonably integrated with their back-office operations and, eventually, with external parties. (For those interested in eGovernment literature, focus is on cities placed in phases 4 and beyond in their eServices offering).

Twenty-five cities participated in five working sessions or submitted their presentations, ideas and comments; although in the final phase an in-depth analysis has been made of seven major cities in seven different countries. This analysis includes a description and explanation of the current status of their e-Government programs, according to a common index provided by the editors and a live call with the senior executives in charge of the program in each city, formally Chief Information Officers, heads of the e-Government unit or under other names. The cities participating in this phase are Barcelona, Birmingham, Munich, Stockholm, The Hague, Turin and Vienna. They all have an explicit e-Strategy or e-Government Strategy and they all publish results, so it is easy for the reader or the researcher to check or complete the analysis.

All these cities are the capitals of metropolitan areas and have a common base of city services, although it should be mentioned that the competences and resources may vary. In some cases, the "Big City" or Metropolitan Region holds only a few coordination bodies or runs limited sector programs (such as transportation or waste management) and in other cases there is a real political and managerial authority. Similarly, some cities run major public housing programs, social services, healthcare or education, whereas some do not.

Having described the inherent City Models for each of the cities analyzed, a number of conclusions have been reached regarding aspects found to be common or showing a particularly high relevance.

e-Drivers

Why do cities engage in e-Government programs?

Reasons may vary, but these cities usually see themselves as a driver or a main agent in the development of the information and knowledge economy at city level. In order to do this, some of them have been intensely reshaping urban planning, deploying new communications infrastructures, running major programs to attract investments or developing local entrepreneurs. Therefore, being an active player in the field of e-Government is perceived as a piece of the same strategy, or as a "must" to gain further visibility and credibility.

Years ago, many cities pioneered the transition to a new model of "public management", focused on superior levels of efficiency and effectiveness, providing more transparency and participation or "putting the citizen first". For such cities, e-Government is an enhancement of these policies or an opportunity to launch a new phase of service (or "business") transformation and process reengineering. In these cases, the emphasis may be placed either on improving service levels (especially in relationships with the citizens) or on gaining efficiency and cost savings, but there is usually a continuous line between both topics.

Things have changed significantly since these programmes were launched (six to ten years ago). The extension and popularity of ICT, and the Internet, have boomed among citizens, businesses and in the ordinary

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

running of every council. So now, for most cities e-Government is no longer merely an option or a political pipedream. According to Johan Särnquits from Stockholm, now "it is a must, something that people take for granted" -residents or businesses expect to deal with the Council through the web, as they do when they buy travel tickets, check their bank accounts, order books or download music.

It is important to notice that e-Government is not considered a technical or technological issue, even when it is managed inside the IT department, but rather a topic related to "business" - the deployment of new services, improving existing ones or re-engineering operations. Moreover, as was mentioned by the Mayor of Barcelona, "it is no longer possible to imagine any public policy without the support of information and communications technologies".

Following a certain tradition on the literature of management, the study identifies ten "key success factors" or conditions (individually necessary and sufficient on the whole) to attain the goals of the e-Government programs in the local world and in every kind of public organizations.

These factors would be:

1. The focus of the services towards the citizen (to make their life easier), choosing services of high impact and demand
2. Achieving a sustained political support
3. Assuring that the program is sustainable, in terms of effectiveness and efficiency
4. Having an explicit strategy
5. Having a dedicated unit for the coordination and leadership of the program
6. Constructing a common architecture of information
7. Assuring the participation of the different interested parties through change management
8. Searching the massive social adoption through sound marketing and communication
9. Displaying the projects and the operations in a very professional way, from both a technical and managerial point of view
10. Establishing agreements and cooperation with other administrations and with the private sector.

1. Making People's Lives Easier

Nowadays, leading e-Government cities offer citizens and businesses an array of services that are helpful in their real lives, 24 hours a day and 7 days a week. When describing their services, "easy", "time-saving" and "convenient" are common words.

They focus their innovation on solving the most common problems and needs of the majority. They are demand-oriented. Success is now being measured in terms of adoption (effective usage of the service by the population) and user satisfaction.

In some cases, e-Government programs are an evolution or a complement to citizen relationship programs being placed on site (in public city offices) or phone (some call centres) over the last decade, or even earlier. These programs offer a single point of contact with the Council, regardless of their internal organization, and are run by a separate structure or, in some cases, outsourced.

Being multi-channel (or "click-call-face"), sharing the same systems and databases for different channels is now a common goal in the cities we surveyed and a requirement for the new technological platforms they are now building.

More recently, interest targets usability (providing features and a lay-out that people can easily recognize and deal with), accessibility (applications being open to users with reduced physical or mental capacities) and technical neutrality (being usable regardless of any particular software).

High-Impact Services

After a number of years designing and implementing advanced e-Government programs, all cities recognize that a key for success is providing services that match a large demand and attract a critical mass of users. And they all thrive on what in the private sector are called "killer applications", or "high-impact services" in the public space. These are important to facilitate rapid adoption and move public interest and habits to the

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

usage of the city e-Services. The key is to find the types of applications people (or businesses) use frequently and intensely, and where they can gain time, money and convenience if performed online.

Change of residence or business address	Payment of taxes and fines
Permits for home improvement work	Making an appointment with a city office
Registrations of business and trade	Questions, claims and complaints
Application for public housing	Access to parking licences
Permission for works or events in streets	Registration of dog licences
Organising a wedding	Application for a post as civil servant
Voting ticket application	Book loans at a public library
Submitting and checking bills	Downloading information on registry and cadastre of a piece of land
Documents of the city registry	

The previous table shows a list of some of these popular services. In many cases, cities have targeted businesses and professionals as the main users of e-Services, as they are more accustomed to the Internet for dealing with customers, suppliers or banks and they usually have a digital authentication. Tax applications are some of the most extended everywhere. But applications related to urban planning, mobility and all kind of permits are growing. For individuals, the most popular services are those involving housing, libraries and the obtaining of census-related documents.

The most advanced cities offer a full range of these city services, covering 50% to 80% of the whole potential volume of transactions.

2. Secure political support

Although the emphasis may vary, in all cases e-Government is part of the strategy, of the ensemble of policies or the action plan of the municipal Government. The CiO of Stockholm city council says: "e-Government is a political component of the city. It is, of course, instrumental, but it also has a significant political dimension now. (...) I would say that the stakeholders are the politicians. No argument there."

Certainly, major e-Government programs cannot be developed without political support, which must be sustained and, as far as possible, remain out of the political turf.

In many cases, e-Government programs were launched and sustained by a Mayor or Vice Mayor with a personal interest and keenness on technology.

However, the CIOs and proponents of major investments and support for e-Government programs should no longer complain of the lack of interest from politicians and the difficulties in securing their buy-in. They should provide the incumbents with good practices, better ideas and tools on how ICT can support their political priorities. In many cases, the benefits of e-Services are not always evident. The point is how ICT may match the cities' strategies on transformation, growth, inclusion or better Government; how ICT can really deliver; how politicians and senior executives can capture the potential benefits of these investments.

3. Sustainability

Nowadays, the economic and social sustainability of the investments in ICT and e-Government programs is a growing concern in many public organizations, as it was in

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

the commercial sector some years ago. Investments in ICT are competing with others in fields such as public works, transportation, schools, housing or social programs. And they need to show that they pay back (even if other programs do not need to demonstrate their pay-off, as was mentioned "off the record" by one of the participants). The paradox is that at the same time, these programs need to be big, ambitious enough and long-term-oriented to really capture benefits.

Some cities are starting to observe the gains from their efforts in terms of internal efficiencies and cost savings. Some are reaching a more than acceptable level of "channel substitution", which means that the Internet (with much lower costs of delivery per unit) is taking over from the traditional, much more expensive channels. Adoption and sustainability are closely linked.

Leading cities now select their investments in ICT very carefully, prepare business cases very professionally and try to set metrics and reviews to monitor achievements. But not many are measuring the real impact of these investments in terms of productivity, growth and job creation for the whole city.

4. e-Strategy

Advanced e-Services (those of a transactional and interactive nature) require the integration of multiple components, a shared view and, as already mentioned, sustained long-term efforts.

Leading cities in our study are using an explicit document of Strategy to set priorities, provide leadership and governance over the e-Government programs and align the entire organization. This is also being used to justify and secure additional investments.

That document is a road map for implementation and to set a public (internal and/or external) commitment in terms of contents and deliverables, as well as a time-frame. Some cities are publishing part of their ICT strategies on their websites.

It is interesting to note that, in most cases, cities no longer speak of an "e-Government strategy" but of e-Strategy, ICT Strategy, Business Transformation or other names. Actually those documents cover all the matters on how technologies support, enable or even drive the improvement and transformation of the whole process of the council and the city policies. E-Government is embedded in the e-Strategy, as e-Business or e-Commerce has become an ordinary part of the IT strategy and the business strategy of any company.

5. Someone in charge

All the cities in this study have a dedicated e-Government unit (sometimes with different names), placed at the top level of the organization, such as the office of the Mayor or the office of the city first executive (CEO).

Usually, this unit provides guidance, coordination and support. It manages projects and deals with the central resources allocated to e-Government programs, but it does not necessarily have proper executive power.

In most cases, it is a small unit whose members have "consultancy" skills, combining IT, process management and relational skills.

6. The importance of a common Architecture

All the CIOs (or similar) participating in the study coincided in a kind of obsession for building a single "model" or, more precisely, a common architecture.

e-Government requires integration, from the front-end to the back-end, trans-departmental, or even crossing the traditional boundaries of the council. Integration means a common language, strong standards and a set of tools to facilitate communications.

e-Government pushes cities to develop (or buy) new systems, or at least new service components (like authentication, digital archiving or document management). There are obvious advantages of scale and serious risks of mismanagement.

In general, e-Government challenges the quality and the organization of the information (especially raw data, such as user or geographic information systems data), business

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

processes and applications and the way to make them evolve. Everything becomes transparent and expensive.

Most cities are investing heavily in new technical architectures and platforms (named "Service-Oriented Architectures") and building new information and technology frameworks. Some are considering re-centralizing their IT delivery, internally or via outsourcing.

7. Getting people on board

All the cities in our study recognized that internal adoption among politicians, executives and civil servants is key to success. e-Government challenges the rules, habits and cultures of traditional bureaucratic public organizations.

The senior managers of central and sector departments (the leaders of the different "businesses") are identified as the main potential barrier, if they position themselves against the e-Government program, or are indifferent. Senior executives are the actual "owners" of the main service processes and they should find the advantages of being engaged.

The commitment of politicians (mainly the Mayor), regulatory changes and a proper "change management" approach are needed. Professional "change management" programs (considering human resources and organizational development) are being deployed in some cities.

Nevertheless, all the participants consider internal adoption to be a very complex and tough issue, and strongly advise other cities to be cautious, patient and tolerant to frustration.

8. Sound Marketing and Communication

If adoption is fully recognized as the main (or at least one of the main) test for successful e-Government programs, all the cities in the study recognize the need to use sound marketing and communication to facilitate the diffusion of e-Government among the public. Strong (and costly) marketing programs should be considered in e-Government programs as an investment, as is the case in technology investments or, more recently, in change management.

The participants recognize that traditional public or social marketing is not very appropriate for this type of programme, in which the cycle of adoption and maturity is complex and should be tailored to different audiences. The goal here is not to improve public image or build brand identity, but rather to shift individual attitudes and, at the end of the day, acquire new users and more transactions.

In marketing e-Government programs, cities should not be focused only on campaigning but also on the full circle of product development and public acquisition. They should know the characteristics of demand in depth, understand the users" needs and expectations, secure their involvement in the whole design and implementation process and listen to their feedback. Some cities are introducing "new" (in the public space) tools to understand the position of the customers in the acquisition process and help them to be aware of the service, rousing their interest, letting them try and retain loyal users.

9. Very professional deployment

As was expected, on reading the last remarks, all the cities recognize the increasing complexity involved in major e-Government programmes, as supply and demand grow and external and internal users and stakeholders become more demanding. As one participant explained: "everything became bigger and more complex, thus demanding excellence in planning and execution."

Big e-Government programs require sophisticated management, new skills and capacities and a culture of delivery. Among the most-quoted new skills were those related to implementation strategy (not mere strategy design), programme and project management, designing enterprise technical architectures and those pertaining to professional change management, marketing, public relations and advertising.

Many cities buy these capacities from external sources, but they all recognized the need to develop internal skills to improve contracts and control suppliers.

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

In terms of general or personal skills, the participants mentioned the need for a new type of civil servant or officer, new leaders focused on the citizens and their expectations, able to broaden their scope and "see" the whole council beyond their own department, eager to take responsibility for sharing and being a part.

10.Cooperation and partnership

Complexity, scope and volume of current e-Government or information-enabled operations in many cities are requiring new forms of cooperation and partnership. These are not the only reasons.

Many cities are engaged in projects or platforms that go beyond the strict boundaries of the council, involving metropolitan areas, the province, the region or even national initiatives.

Some city portals in central Europe are partnerships between the council and other public and private players. Some cities in different parts of Europe are engaged in new (mixed) forms of contracting out services, infrastructures or even "business transformation" programs.

As the participant from Turin mentioned, the issue is that the "traditional perimeter of e-Government is now extended". Leading cities recognize this fact and invest in cooperation and in the new relational abilities that are now required.

After years of intelligent and sustained effort, the cities that participated in our study are successfully offering a wide range of electronic services to their populations and achieving significant adoption figures. They are starting to reap the benefits of these investments.

They, by themselves and with the help of external partners (other administrations or commercial companies), are developing new abilities and skills.

There is still a big challenge facing the transformation of the back-office or the ordinary processes of the regular administration, and not just in technical terms (the design and implementation of new platforms) but much more in organizational terms – putting new service processes in place and changing the culture of people's and the organization's behaviour.

The political and managerial journey of e-Government is still moving forward.

Recommended reference

RODRÍGUEZ, José Ramón; BATLLE, Joan; ESTEBAN, David. "European Study of E-government City Models" [on-line review]. *IDP. Revista de Internet, Derecho y Política*. No. 5. UOC. [Date of consultation: dd/mm/yy].

<http://www.uoc.edu/idp/5/dt/eng/rodriguez_batlle_esteban.pdf>

ISSN 1699-8154

About the authors

José Ramón Rodríguez Bermúdez

He is assistant manager of Computer Systems and Organisation at Barcelona City Council, as well as managing director of the Municipal Computer Institute and head of its e-administration programme. At Eurocities-Telecities, he led the group that prepared the European Charter on Rights of Citizens in the Information Society, and is currently heading up the e-government group. He has over 25 years'

Universitat Oberta de Catalunya

IDP REVISTA D'INTERNET, DRET I POLÍTICA
REVISTA DE INTERNET, DERECHO Y POLÍTICA

http://idp.uoc.edu

European Study of E-government City Models

professional experience in the private and the public sectors. He has been a director in several public administration bodies and in the public health sector. Among other positions, he was the general secretary of the Basque Health Service. He worked for 15 years as a consultant and director of computer systems and organisation within international consultancy firms. Among other positions, he was the European head of the health sector at PricewaterhouseCoopers Consulting. He is a collaborating faculty member in the Computer Engineering Department at the Open University of Catalonia and the author of books and research papers on computer project management, and information technologies and systems management, e-health and e-administration. He is a licentiate in Philosophy and Arts and has been a member of the technical staff for the Spanish Social Security, as well as participating in the General Management course at IESE and obtaining various diplomas in company management from the Harvard Business School and other universities.

Joan Batlle Montserrat

He is Head of the International Projects Department at Barcelona City Council's Municipal Computer Institute. He is a Licentiate in Physical Sciences at Barcelona University and has a Master's degree in information technology management from Ramon Llull University. He works in innovation projects within the field of public administration (authorisation and credentials based on digital certificates, citizen participation and e-voting, semantic Internet application for improving Internet-based public services, use of natural language processing and voice-recognition technology for improving telephone support services, development of new municipal services to be used through mobile devices...). For the last year, and within the EUROCITIES European network, he has been the head of an international working group on e-government models in cities, as well as determining factors for the success of e-services.

David Esteban Ayerbe

Director of the Techforce Consultoría company, David Esteban has vast experience gained through his responsibilities and activities within the ambits of research and innovation (applied to telecommunications and information technology) as well as strategic consultancy for private companies (banking, telecommunications, services, industry) and public bodies (State, regional and local administration, as well as the European Commission, for whom he is a regular expert in advanced technology programmes). Within Catalonia, he has collaborated in strategic projects with numerous public authorities, such as Barcelona City Council, Catalonia Regional Government, Barcelona Provincial Government, Localret and a large number of local councils and other public bodies. He has published various articles and studies, and has collaborated in various university degree and post-graduate courses, as well as giving presentations at events and conferences.

4. A methodology for benchmarking local e-government: design and testing

This chapter aims at describing a benchmarking methodology and presenting the results of the pilot measurement. First, through Batlle-Montserrat, Calderón & Gascó (2008) the researcher explains the general project organization for a bottom-up design of the methodology. This approach was considered key to ensuring a high level of acceptance in the results of the pilot survey. Second, Batlle-Montserrat, Blat, & Abadal (2014) makes and in-depth description of the methodology and the results of the pilot measurement.

4.1 A bottom-up process to design a benchmarking methodology

Batlle-Montserrat, Calderón & Gascó (2008) describe the project of designing a benchmarking methodology tailored to local level e-government, following a bottom-up process. The paper goes through the project phases to show the bottom-up approach taken and how the different challenges were faced. The project dealt first with the creation of the working group and the engaging of cities. Second, the focus was put on the work group organization and the design of the process to achieve the main milestones. The working group had to identify the key characteristics of the methodology, and to build the catalogue a services containing the common services on which to base the comparative evaluation. In addition, the working group defined the right outputs to ensure the learning aspects of such an exercise, and finally agreed on the tools so as to be able to gather data in an affordable way.

Collaboration and the Knowledge Economy: Issues, Applications, Case Studies
Paul Cunningham and Miriam Cunningham (Eds)
IOS Press, 2008 Amsterdam
ISBN 978–1–58603–924-0

E-Government Bench-learning Project

Joan BATLLE[1], Raquel CALDERON[2], Mila GASCÓ[3]
[1]*Municipal Institute of Information Technology, Barcelona City Council*
Av. Diagonal 220, Barcelona, 08018, Spain
Tel: +34 93 2918230, Fax: + 34 93 2918220, Email: jbatlle@bcn.cat
[2]*Penteo ICT Analyst, C/Córcega 282, Barcelona, 08008, Spain*
Tel: +34 902154550, Fax: + 34 934154564, Email: r.calderon@penteo.com
[3]*Pompeu Fabra University, C/Ramon Trias Fargas 25-27, Barcelona, 08005, Spain*
Tel: +34 93 542 2380, Fax: + 34 93 542 2372, Email: mila.gasco@upf.edu

Abstract: The paper presents the e-Government Bench-learning project, which is being carried out by a group of 18 European cities lead by Barcelona, with the technical support of PENTEO ICT Analyst company and the Pompeu Fabra University in Catalonia as Scientific Advisor, within the Knowledge Society Forum of the EUROCITIES Network. It is a bottom-up bench-learning exercise that tends to cover the lack of useful information about e-Government progress at city level and provides a framework for further measurement. The motivation, objectives and work plan are presented. The methodology used in the project is explained in detail. Finally, as it is an on going project, the early results are presented showing the shape that the final results will have at the end of the project life.

1. Introduction

e-Government is the public administration's true revolution. It brings major changes in the way the administration works, the way it delivers services to citizens and companies and the way citizens are interacting with it. It is a radical transforming process that can be carried out thanks to Information and Communications Technologies that bring a wide range of possibilities to rethink the whole public organization's way of working.

According to EUROSTAD, the public sector is responsible for near 40% of the GDP in Europe. These figures point out how the transformation of the public sector is of capital importance for European economic growth. In addition, in Europe, the subsidiarity principle ensures that decisions are taken as closely as possible to the citizen. That means that the European Union does not act unless it is more effective than action taken at a national, regional or local level. In such a context, cities - which benefit of a noteworthy autonomy with an important number of competencies - are thus playing an important role in the organization of the European society. This fact is also reflected by the surveys carried out in Member States, showing that 70% of the citizen's interactions with public bodies are with local public administration. Although e-Government is a reality at all public organizations levels (state, regional and local), it has therefore its biggest impact at a local level.

Nowadays, all city governments and administrations find themselves in a transition from the old model of local public organization to a new one more efficient. Gradually, e-Government is being more and more encouraged. The relationship with citizens is changing from a scenario based on a multiplicity of specialized counters to a "one-stop-shop" model attended by multivalent civil servers. It is also evolving from time-consuming situations in which citizens are asked to do the coordination job between various institutions (turning back to submit new information obtained in other places) to a citizen-

oriented organization capable to know who the citizen is, what are the citizen needs in each case. In other words, these changes try to lead to proactiveness and providing more services for less.

As this transformation touches the core business of the local public administration, cities must carefully manage the process in order to shorten it and ensure a satisfactory output. City managers need to have relevant information about what processes to tackle first, how to remodel them, and how to measure the progress. From the cities' point of view, two important things are needed to lead the transforming process successfully: the existence of e-Government city models and the measure of the city's e-Government development. Where is the city going? How is the city doing the journey? At which stage is the city? These are capital questions each CIO needs to answer to make the transformation process a success.

The previous survey about e-Government City Models entitled "e-Government City Models: cases from European cities" [1], conducted during 2006 and 2007 in the context of EUROCITIES network and within the Knowledge Society Forum thanks to the collaboration of all members of the e-Government Work Group, provides a valuable tool for city managers to initiate and guide the e-Government transformation. This survey, which constitutes a qualitative approach to e-Government on European Cities, shows how seven European leading cities faced such transformation along the last ten years, which were the key decision taken and the main inspiration of their policies.

Although a lot of lessons can be learnt from that survey, it is only one of the needed contributions to foster the local public administration transformation. The other missing dimension is the measure of how a city is progressing in this important process.

Up to now, all the available studies about e-Government measurement, all the data measuring carried out and comparing e-Government evolution has been tailored at country level (i.e. the valuable Cap Gemini contribution to the "Online Availability of Public Services: how is Europe progressing?"). Although some information is also available about the regional level, only a small amount of information is focused on e-Government at a local level.

Meanwhile, while the indicators used at country level are based on standards (there is a growing tendency on that just after the Tunis World Summit of Information Society in 2005), the presence of such standards at a regional level decrease. Finally, at local level, there is such a low use of standard indicators that it is not possible to perform quality comparisons between different city cases.

The Cap Gemini Benchmark has a long tradition, and constitutes a valuable source of scientifically measured data concerning e-Government. However, it was designed in year 2000 in the framework if the e-Europe Action Plans to Member States ensured a generalized electronic access to main basic public services. As a consequence, it is focused on e-Government at a state level, that can be easily derived from the list of 20 basic services analysed. A quick analysis of these twenty services shows that it is not applicable to local e-Government measurement.

Another of the contributions of the Cap Gemini Benchmark is the popularization of the four levels of e-Government services sophistication. These models are based on the well-known four levels: information, one-way interaction, two way interaction and transaction. City e-Government services are evolving quickly and deeply transforming "business" processes. The Cap Gemini model is more difficult to apply to local e-Government measurement. We need to come back to the original and more ambitious model of four phases of e-Government introduced by Gartner Group [6] in 2000, which are: presence, interaction, transaction and transformation.

Moreover, regarding local level, benchmarking surveys mainly focus on the general aspects of the official website. Although, there are some exceptions of surveys focused on

e-Services offering such as the "eCitizenship for all benchmark report" [2][3][4] carried out by Deloitte and promoted by EUROCITIES network with the special support of The Hague City Council, in general, surveys never focus on e-Services quality and citizen adoption. Therefore, a complete view of the e-Government process in cities is not possible today.

This lack of suitable indicators for measuring the progress of local e-Government actions is what motivated the Barcelona City Council to start a Bench-learning project, with the collaboration of PENTEO ICT Analyst Company within the EUROCITIES Network.

This paper presents the foundations and preliminary results of this project.

2. Objectives

The aim of the project is to contribute to an e-Government measurement in the area of e-Services provision, quality and acceptance by citizens in European local public administration.

The project will provide a measurement framework and a set of indicators to perform benchmarking and the first results of the methodology application on a set of 18 European cities.

Finally, a collection of good practices will additionally arise at the end of this project contributing to the Good Practices Databases of the European Community and fostering a general learning process that will facilitate the transferability of experiences, increase success and reduce failures of the e-Government transformation that is actuates at city level.

3. Work plan

The project work plan was initially designed to develop all the project activities within twelve months, this period including four EUROCITIES Knowledge Society Forum events allowing members to meet easily during the life of the project. After the kick off meeting last October 2007, the project is expected to finish at the end of October 2008.

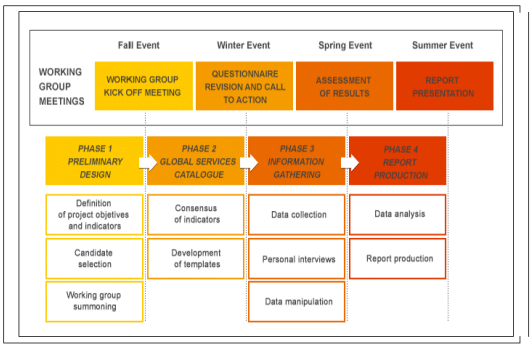


Figure 1: Project Work Plan

The project life is structured in four phases as follow:

- Project structure creation
- Global Services Catalogue generation
- Information recollection
- Report production (includes the data analysis and results presentation)

Each phase includes a workshop with all project members and several project coordination meetings. Each phase will produce deliverables as showed in the diagram above.

4. Methodology

In October 2005, during the EUROCITIES Knowledge Society Forum meeting in Prague, Barcelona City Council launched a survey carried out among the attending cities in order to find out which were the general interests of Knowledge Society Forum members regarding e-Government. The topics covered issues ranging from the strategy to the implementation of e-Government services. According to the results, the most interesting topic was "The strategic approach of e-Government". With that quick survey, the foundations of the new e-Government Work Group were set up.

This initiative was established as a response to a new understanding of cities and to face coming Knowledge Society challenges. At the same time, it was understood as a logical evolution from the former working group on e-Rights, chaired by Barcelona City Council representative, that just closed in June 2005 with the presentation of the European Charter of Citizen's Rights in the Knowledge Society.

The first Work Group workshop was devoted to the definition of the objectives, outputs, methodology and initial work plan. In that meeting held in Cologne (January 2006), the results of the survey carried out in Prague were analysed and crossed with the last "eCitizenship for all benchmarking report" [4] results, the Ministerial Declaration of the Ministerial e-Government Conference "Transforming Public Services" (held in United Kingdom in November 2005), the priorities of the European Commission, and the final report of the e-Government Policy Stakeholders Meeting promoted by the European Commission (September 2005).

In that meeting, members agreed to work on topics related to: strategic approach of e-Government, interoperability and standards for the e-Government services, financial sustainability and take up or citizens' adoption of e-Services. Although security related issues were also identified as of capital importance, it was kept apart to be treated in a specific Working Group focused on e-Security already running and chaired by Stockholm City Council representative.

At the same time, two main outputs were foreseen to be reached at the end of the project: "eGovernment City Models: cases from European cities"[1] as a final report on "Key Success Factors on eServices adoption" [5]. After a year and a half of work and meetings, both papers were presented during the Spring Event of the EUROCITIES Knowledge Society Forum held in Barcelona in March 2007. Just after achieving the planned outputs, the Work Group was dissolved.

In June 2007, in Bologna, during the EUROCITIES Knowledge Society Forum summer event, the Barcelona City Council representative made a new proposal of work to the Forum. This new work proposal was following the same action line as that of the previous Work Group, "The strategic approach of e-Government", but was focused on benchmarking local e-Government and identifying good practices.

The work proposal was centred on making a contribution in the field of e-Government measurement restricted to e-Services provision and adoption in European cities. Far from being a typical benchmarking exercise in which the results shows only rankings of cities, the work proposed aims to start from the bottom listening cities and understanding the kind of services they provide and the real needs cities have to manage the e-Government transformation. This approach leads us to a clear learning process based on best practices identification, description and dissemination. This is the reason why the project is named the "e-Government Bench-learning Project".

Initially it was presented as a project to be developed in a year time frame, as a bottom up exercise with the collaboration of the whole EUROCITIES network, therefore breaking natural barriers of the Knowledge Society Forum, and with the possibility to include other non-member cities eventually interested. With clear objectives, outputs and outcomes, the project governance was based in three key roles: Barcelona City Council as Project Coordinator, PENTEO ICT Analyst as Technical Coordinator and a Professor from University in Catalonia as Scientific Advisor.

The role of the Technical Coordinator is essential for the definition of a pertinent work plan, to ensure the use of the right methodology and guarantee an independent point of view. The Scientific or Academic Advisor contributes to maintain project coherence with existing research works and scientifically relevant.

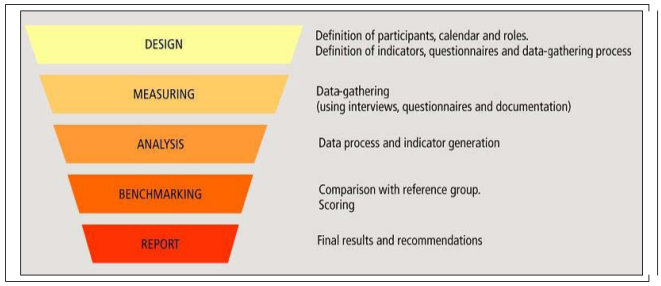


Figure 2: PENTEO's MÈTRICA Methodology

The methodology employed is based on PENTEO's MÈTRICA Methodology including some ad-hoc arrangements. The main characteristic of the resulting methodology is its bottom up approach, which is coherent with the project aim of contributing and providing a useful tool for city managers. To that aim, the collaboration of cities in the whole process is of paramount importance. This approach is combined with the guidance of the Technical Coordinator and the Academic Advisor.

Through several meetings the Work Group has been debating and defining the most significant services to be evaluated and the more useful groups or categories to be defined. In addition, the Group has chosen the most meaningful indicators to be used to draw up the initial situation of the service adoption and that have to be monitored to follow their evolution along several Bench-learning exercises over the years. Apart from attending and participating in the project meetings, each Work Group member, from all the involved cities, will be actively taking part on each phase of the project. They will be asked to contribute through indicators definition, questionnaire preparation, reporting structure outlining and data provision.

A constant communication is being held between Technical Coordinator and participants to guide the work and solve questions during the picking up processes. On the Technical Coordination side, a team is devoted to data analysis and classification. Lastly, the Project Coordinator, the Technical Coordinator and the Academic Advisor maintain regularly coordination meetings. Therefore, an intense work pace is being carried out to accomplish the initial work plan.

After the first project presentation in the Bologna's EUROCITIES Knowledge Society Forum event, the project team proceeded with the first round of cities recruitment, which lasted from the end of June to September. Meanwhile, and just after getting the minimum support required from cities, the Project Coordinator applied for the creation of an official Work Group in the EUROCITIES Knowledge Society Forum, which was accepted. The Work Group of e-Government Bench-learning was officially launched in the

EUROCITIES Knowledge Society Forum autumn event held in The Hague (October 2007) and the project was presented to new members.

Following the project launch, a second round of cities recruitment started in order to reach a significant number of cities to perform the bottom-up exercise. In December 2007 the first phase was closed reaching the presence of 18 European cities, all of whom belong to the EUROCITIES network (see Table 1 below).

Table 1: Participant cities

Antwerp (Belgium)	Barcelona (Spain)
Bergen (Norway)	Bilbao (Spain)
Birmingham (UK)	Bologna (Italy)
Enschede (Netherlands)	Helsinki (Finland)
Lyon (France)	Malmö (Sweden)
Milan (Italy)	Murcia (Spain)
Rijeka (Croatia)	Sanliurfa (Turkey)
Tallin (Estonia)	Turin (Italy)
The Hague (Netherlands)	Vienna (Austria)

In addition, in this first phase, the project team revisited the scope of the project by giving a formal definition of its indicators and objectives according to feedback received.

The second phase of the project was focused on the elaboration of the Global Service Catalogue. Here each city has provided a list of e-Services they provided. Amongst this a common set of services has been selected on which the bench-learning exercise will be performed. This list of services is of fundamental importance for successful work and it can be seen as consequence of the "modus-operandi" adopted. This is a cooperative work.

As a first step, an initial survey was undertaken to collect all the relevant services provided by each participant city through ICT facilities. In that first survey cities provided basic information about each service provided. After picking up all the variety of services, a deep analysis was performed, based on the comparisons and trying to infer the most suitable categories or groups of services that can be shared by all European cities. During this phase, a seminar was held in Brussels to discuss different services provided and debate the Global Service Catalogue in order to reach a common understanding regarding service definition and a consensus about the process followed. Following the meeting, a second survey was launched to refine the service list and descriptions. Alongside the new survey, examples of the services previously compiled were circulated thus helping cities to find common or equivalent services to those of the other cities. The cities lists of services were that time enriched with a bigger range of services.

This second phase required more time and coordination by all participants than initially foreseen, and was extended till mid Spring. During that time another workshop was held in Lyon in the framework of the EUROCITIES joint event of the Knowledge Society Forum and the Culture Forum in March 2008. There, a first draft of the Global Catalogue with a proposal of services categorization was presented and discussed. Thanks to the discussion, new services were discussed which enriched the catalogue. At the same time the categories definition was updated with the members' contributions. At the time of writing this paper (June 2008), the project team is finalizing the Global Service Catalogue.

The third stage has in its agenda the recollection, of the data related to service provision as a result of a questionnaire, in order to assess the maturity level, and citizen's adoption. The measurement of the service maturity will be based on the previous works made by Baum & Di Maio [6] extending the range of maturity to include a fifth level on the top to reflect a more advanced degree of maturity based on the introduction of citizen's

participation on the evaluation and discussion processes of public policies. Therefore the model for maturity service measurement will be based on 5 levels as shown in the Table 2 below:

Table 2: Services maturity levels

1. Information Level	Ability to offer relevant information in a one way communication process, usually website based
2. Interactivity Level	Users can generate basic content (e-mail, template, queries) which is introduced in the government data bases
3. Transaction Level	Transactions (payments, certificates) can be completed throughout an electronic channel
4. Transformation Level	Full integration for all e-Government services into a single portal. Users can access all services from a unique virtual office from any place
5. Participation Level	Let and promote citizens participation in the evaluation and discussion processes of public policies (e-Democracy)

Additionally good practices selection and personal interviews of some participants will be carried out at the end of this phase. The discussion and assessment of the collected data and the discussion about the good practices selection will be the argumentation of the project meeting planned by the end of June 2008 and that will lead the project in its last step.

Lastly, following discussion and assessment of the data, an analysis will be undertaken along with the final report. This is included in the fourth and last phase of report production. Following the working methods of the preceding stage, there will be a final meeting aimed at the report presentation.

5. Results

Table 3: Example of services under Education category

Basic Services	Additional services
Pre-school children education	Photograph for oral history
Children education	Media workshop in neighbourhoods
Adult education	Summer camps
Funds for cultural projects	Materials distribution for schools from local audiovisual centre
Virtual learning environments (cooperation home-school)	
Libraries	
Cultural heritage (museums, historical buildings...)	

Up to now, the results obtained by the project at the time of writing this paper are related to the Global Service Catalogue. At present the draft catalogue is composed of ten categories, families or group of services. All these categories are vertical with the exception of two. These exceptions are: the one devoted to Portal services and the one devoted to Participation services. On each category you find all the services related with the topic of the category. Under each heading the services are classified in two groups: basic services

(those common to the majority of the participant cities) and additional services (which are specific of some cities). For instance, taking the Education category, which aggregates all the services related with the education of citizens and the access to different educational institutions, you find the services listed in Table 3 above.

The structure of the Global Service Catalogue is as follows:

1. Portal: (present in 94% of the cities analysed). This is a transversal category of services. Here in that division there are all services that allow channelling of the services offered to citizens (i.e. city's web pages, citizen's personal folder, consultation on line, newsletters, GIS and map of the city, customized web pages, procedures information, etc.).
2. Participation (present in 75% of the cities analysed). This is also a transversal family of services. Here you find the services that aim to encourage a relationship between the citizens and their administrations promoting or being on themselves a pre-stage of e-Democracy (i.e. as basic services: City archives consultation, City Council Plenary sessions access, Participatory processes, City Council listens -on-line complaints and suggestions, and as additional services: Second Life Island, Reservation for municipal buildings, lost and found...)
3. Education and culture (present in 100% of the cities analysed) This family of services includes services related to children, adult and virtual learning services, services related to cultural projects and libraries.
4. Employment and business (available in 75% of the cities analysed). Here there are all the services related to e-recruitment, tendering and small business promotion. Those services are targeted at professionals and small businesses in order to improve economic growth of the area.
5. Environment and regeneration (present in 44% of the cities analysed). This group includes services related to garbage collection and services related with the maintenance of the communal properties as well as to the encouragement and acquisition of habits with have to do suitable urban growth.
6. Leisure and sports (running in 44% of the cities analysed). All services related to sports lending and services of the same nature are aggregated in this category as automatic ticket sales and event information.
7. Population (developed in 69% of the cities analysed). The services related to ease the necessary transactions among citizens and administrations related to the life-cycle of a person living in the city are put all together under this heading. It also can be named life-cycle services. Personal certificates, population registry. Residents' registration, burial places, digital documents management system, registry documents management, etc. are some of the basic services included. Added services can be found for instance marriage on-line and pets registration.
8. Social Care (provided in 56% of the cities analysed). The services linked to Health, Housing, and care for special people (Aged people, children, disabled people...) are in this section.
9. Transport (present in 56% of the cities analysed). This family group services related to ease the physical mobility through the city by various means of transport as well as other issues related (car parking, vehicle taxes, bicycles lending, on-line car fines payment...)
10. Urban Planning (offered in 75% of the cities analysed). All services associated to land use and property related issues as permits for construction, building regulations, certificates, land acquisition, are classified under this heading.

The Global Service Catalogue presented will be used together with the service maturity levels as the basic reference to carry out the bench-learning exercise among participant cities. Then, using all available data it will be provided a map of the average service maturity of each category of the Global Service Catalogue in the eighteen European cities. That information will be farther used to show the Bench-learning results per city.

For each city a map comparing the city with the average result of the survey will be provided (see Figure 3 as an example). The map will have a row for each service category of the Global Service Catalogue and a column for each service maturity level. On each category the service maturity level of the city (coloured bar) is compared with the average service maturity level (blue line).

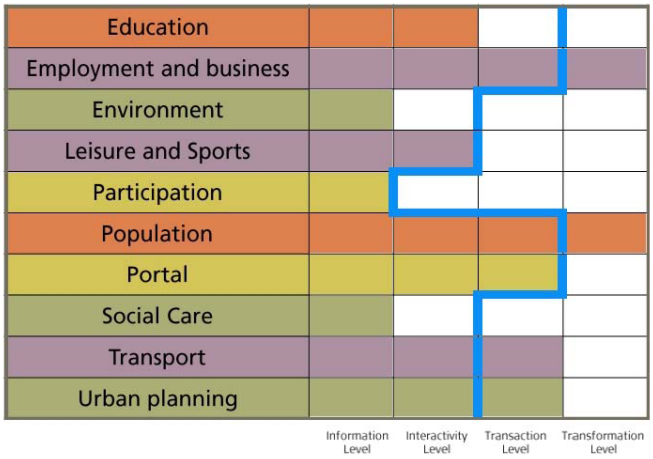


Figure 3: City map example

One of the advantages of this graphical representation is that it makes it possible to see from one view the position of the city compared with the European average in all of the analysed categories. At the same time, it provides a clear way to represent the obtained results without using the well-known lists or rankings of cities ordered by performance or success, or using the typical charts showing all cities results at the same time fostering the competition between cities.

City manager will see on its city map the areas in which the city is in a strong position and can provide examples of good practices to other cities. At the same time city managers can find categories in which the city is in a weak position, under the average, therefore with a clear need to improve.

As a result of the methodology used, the project will provide, as a second output, a well-grounded selection of good practices for each of the Global Service Catalogue categories. These good practices will have been selected following a deep and strict analysis of all the cases studied that made a city over the average under the scope of the project. All cities needing to improve specific services will have the possibility to access this selection of good practices to choose those that can help better to solve the services weaknesses.

6. Conclusions

This paper presented the e-Government Bench-learning Project that is being carried out by a group of 18 European cities lead by Barcelona, with the technical support of PENTEO ICT Analyst company and the Pompeu Fabra University in Catalonia as scientific advisor, within the Knowledge Society Forum of the EUROCITIES Network.

The main project outcome is to reduce the lack of information about e-Government progress at city level and provides a framework to be used in further measurement exercises. The project innovation relies in its methodology based on a bottom-up exercise in which the cities lead the process in order to ensure meaningful results to help city managers to drive the e-Government transformation. It has been designed to be mainly a learning process for all participant cities.

As it is an on going project, only the intermediate results are presented in this paper, showing the shape that the final results will have at the end of the project life.

Apart from the methodology designed, other outputs deserve to be mentioned such as the use of an extended range of levels to measure the service maturity and a new Global Service Catalogue tailored to the specific need of European cities.

In addition, the project proposes an innovative format to present the benchmarking results. It is a format designed to highlight the position of each city in respect of the average position of the European cities surveyed avoiding these competitive top-ten lists.

Finally it is necessary to remark how the methodology used in all the process provides a high value selection of good practices endorsed by the objectivity of all the followed process.

References

[1] Batlle, Esteban and Rodríguez. *"e-Government City Models: cases from European cities"*. Municipality of Barcelona, EUROCITIES: Barcelona, Brussels, 2007. <http://www.EUROCITIES.org/include/lib/sql_document_card.php?id=5131>

[2] Deloitte. *"e-Citizenship for All benchmark Report 2003"*. Deloitte, Telecities: The Hague, Brussels 2004. <http://www.deloitte.com/dtt/research/0,2310,sid%3D37085&cid%3D44100,00.html>

[3] Deloitte. *"e-Citizenship for All benchmark Report 2004"*. Deloitte, Eurocities: The Hague, Brussels, 2005. <http://www.eurocities.eu/uploads/load.php?file=eCitizenship_for_All_benchmark_Report_2004.pdf>

[4] Deloitte. *"e-Citizenship for All benchmark Report 2005"*. DeloitteEurocities: The Hague, Brussels, 2005. <http://www.eurocities.eu/uploads/load.php?file=eCitizenship_for_All_benchmark_Report_2005.pdf>

[5] Eurocities, eGovernment Work Group. *"Key success factors for the adoption of eServices"*. Eurocities: Brussels, 2005. <http://www.eurocities.eu/uploads/load.php?file=rep_know_eGov07-SMUL.pdfT>

[6] Baum, C. and Di Maio, A., "Gartner's Four Phases of E-Government Model,". Gartner Group Report No. COM-12-6173, 2000.

4.2 The description of the methodology and testing results

Batlle-Montserrat, Blat & Abadal (2014) formally propose the Bench-Learning methodology. It is a new methodology specifically designed for benchmarking municipal e-government services in Europe.

Following (Batlle-Montserrat, Abadal & Blat, 2011) that justified the need for having such a methodology, the paper describes the new methodology and presents the contributions it makes by comparing it with the general context of e-government benchmarking. The Bench-Learning methodology resulted from the project previously described in (Batlle-Montserrat, Calderón & Gascó, 2008). The process to define the methodology started with the common services identified in (Rodriguez, Batlle & Esteban, 2007b) to build a wider catalogue of common services. This catalogue is the basis for making a comparative evaluation among European cities.

After producing the first prototype of the methodology, a pilot measurement was performed in 15 European cities. In addition, the paper presents the results obtained and discusses their relevance.

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 57

Benchmarking Municipal E-Government Services:
A Bottom-Up Methodology and Pilot Results

Joan Batlle-Montserrat, Barcelona City Council, Barcelona, Spain

Josep Blat, Pompeu Fabra University, Barcelona, Spain

Ernest Abadal, Faculty of Library and Information Science, University of Barcelona, Barcelona, Spain

ABSTRACT

Local governments play an important role as the main contact point for citizens and deliver many more and varied services than any other public administration. Nevertheless, the field of local e-government services (or local e-administration) lacks benchmarking methodologies and rigorous surveys. Existing e-government benchmarks mostly address the national level and do not cater for this wealth of locally provided e-services. Cities are also very diverse, but research shows that European cities share an important number of common services, making benchmarking look feasible. The paper proposes a benchmarking methodology to fill this gap, facing the complexity of this multiplicity and variety. It starts by a bottom-up hierarchical catalogue of services created through participation of the cities. The benchmarking goes beyond service provision, so far measured through maturity, and analyses acceptance by users. The paper discusses the parameters introduced and how to measure them. The paper addresses the issue of the presentation of the results, which is important to help city managers to improve the service provision, its quality and acceptance. The methodology was applied in a pilot study of 15 quite diverse medium and large European cities, and its results are presented within the context of validating the methodology introduced.

Keywords: *Benchmarking, e-Government, Electronic Services, Local Government, Services Adoption*

1. INTRODUCTION

Up to now, the overwhelming majority of e-government benchmarks deals with the national level, which is too general to assess and compare city development of e-government. The few existing local e-government benchmarks usually focus on the city's web site characteristics and content, where service provision is only one of the components. Some of them pay attention to the services maturity, a better measure of provision, which includes their quality, but

DOI: 10.4018/ijegr.2014100103

58 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

the adoption of these services by the citizens, which should be a key performance indicator, has been largely ignored so far.

In addition, most of the benchmarking results are given as an aggregated index and the subsequent ranking of benchmarked organizations. This approach is of very little use in terms of providing recommendations to improve e-services, which is what cities are interested in. Knowing whether a city is higher ranked than others does not help to compare specific local e-government services or to identify good practices to learn from.

A benchmark specific for cities should be based upon, and take into account, the rich range of e-services they offer. As its number is large, grouping services in meaningful areas matching cities, citizens and business interests, is necessary to provide a meaningful comparison. The grouping should keep diversity to allow international comparisons as well.

Service sophistication is not a guarantee of success. Therefore, beyond measuring services maturity, adoption should be taken into account. Moreover, to be really useful, this rich and diverse information of each city should be presented in a more comprehensible way to improve the e-administration.

This paper presents and discusses a new bottom-up benchmarking methodology specifically tailored to cities e-administration, as based on a meaningful grouping of services. The methodology takes into account both service provision and citizens' adoption. The results are presented in ways alternative to summarization into aggregated indices. Presenting maturity and adoption together across the categories of services allows to grasp the overall development of e-administration, uncover heterogeneities in its development, and reveal correlations. Other indicators proposed measure coverage and diversity. City maps show each of the cities e-administration profile with respect to the average, across the different categories of services. New indicators allow cities to identify what services in which cities seem to excel, offering hints of good practices where to learn from.

The rest of the paper analyses first the existing methodologies designed to benchmark local government e-administration, and then presents and discusses the proposed methodology in detail, including its application in a survey among 15 European cities. The survey results are presented and analysed from the point of view of the validation of the methodology. Finally, the paper discusses the contributions made, and indicate future avenues of research.

2. RELATED WORK ON BENCHMARKING ELECTRONIC PUBLIC SERVICES IN THE LOCAL ADMINISTRATION

Both practitioners and academics have been interested in benchmarking e-government services because e-services together with official websites are amongst the most visible parts of e-government (Janssen, 2003) and have a high impact on the constituency through the use of electronic channels. They play a front-end role in public administration, and that maintains e-services at the focus of policy-makers and public managers.

There are well accepted e-government maturity models or stage models that make easy to perform a maturity assessment of e-services provided. As a lot of academics pointed out (Janssen, 2003; Kunstelj and Vintar, 2004; Griffin, Foster and Halpin, 2004; Heeks, 2006; Lee, 2010) these models measuring service sophistication are well known, comprehensible and simple to apply, and are thus widely used in benchmarking.

Although this paper does not aim to discuss the existing (national) e-government benchmarks, it is worth to discuss the methodology and the applicability at city level of the most relevant ones. The CapGemini Ernst & Young benchmark (CapGemini, 2003), developed for the European Commission under the framework of the eEurope action plan and launched in 2001, was designed to promote the online availability of public services amongst

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 59

European Union members states. During its 10 editions, it proved to be a key tool for member states to improve public service availability and a valuable source of information to track the progress of European e-government. It is based on measuring provision and sophistication of 20 public services defined as basic. However, most of them are under state responsibility and are not provided by cities, making it little useful for them. Only its 9th edition recognizes the importance, diversity, and specificity of city services, introducing a few comparisons regarding their sophistication. Its 8th edition (CapGemini, 2009) is the first addressing adoption by users, through comparing sophistication of the e-services provided with a general uptake of e-services, based on Eurostat data, which, as OECD (2009) noticed, are not directly comparable. The 10th edition (CapGemini, 2013) collected data on the use of e-services, barriers for using them, preferred channels, user satisfaction, and perceived benefits through an internet survey involving 28,000 citizens in 32 EU countries, with 27 questions about the 19 most common services. It is an important step forward with respect to addressing adoption but still it does not apply to cities. The OECD (2007) survey revealed that few of its countries had a concept of systematic monitoring and measuring focused on user take-up, the cities situation being quite similar. More recently, OECD (2009) still indicated that it was a new rising activity with limited experience and data.

The Digital Governance in Municipalities Worldwide (Holzer and Kim, 2007) is a rigorous assessment of the practice of digital governance in large municipalities worldwide. It was executed in 2003, 2005 and finally in 2007, and the last edition includes a longitudinal assessment along the three editions. It evaluates website of each city in terms of the delivery of public service and citizen's participation in governance and ranks the web sites. It specifically assesses the categories services provision, privacy/security, usability, content, and citizen participation. The results are presented as an aggregated index and the associated ranking of cities provided. It also delivers the ranking in each of the individual categories. In provision, it checks 20 city-specific services, and each service, when provided, is assessed in terms of maturity with a reference framework of three stages (against four in the European benchmarking mentioned in the previous paragraph). At the end, the main characteristics of the homepage of the higher ranked cities are discussed, which is useful to identify good practices. From the point of view of e-administration, it is limited, as service provision is only one of the five categories analysed and only 20 services are considered, not taking into account the rich variety of services a city provides (our survey identified 81). As with most benchmarks, citizens' adoption of the services provided is not considered. On the other hand, the number of services offered by a municipality through its website is not enough to assess how well this organization is performing in e-administration, neither the maturity of the services offered.

Most e-administration benchmarks provide an aggregated index of all the marks into a final score as their main result. Although global governance benefits from having such an index and the rankings proved to be effective to push European member states to progress in e-service provision, an aggregated index is of little help for practitioners (Hicks, 2010) as it provides insufficient detail to learn from, when the main goal of benchmarking should be that organizations improve their performance (Jansen, de Vries and van Schaik, 2010). Another drawback is that a method for arriving at such an aggregate index must be chosen, and as there are usually no fixed or agreed rules for it (Bannister, 2007) sometimes erroneous decisions are taken (Whitmore, 2012).

The United Nations e-Government Survey (UN, 2012) focuses on measuring progress in online service delivery by national governments around the world. It comprehensively covers the 193 Member States, assesses the technical features of national websites, and the e-government policies and strategies applied in general and in specific sectors for the delivery of essential services. Results are presented by means of a composite index, the UN E-Government

60 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

Development Index (EGDI), measuring the willingness and capability of national administrations to use information and communication technology to deliver public services. The index leads to a ranking of the countries. In the last edition, citizen's use of e-services (the so called 'demand-side') is recognized as a priority, as measuring and reporting the usage level have become important to assess and demonstrate the benefits of e-government initiatives and ensure continued support. Most benchmarking focus only on service provision, but do not take into account the level of use or customer satisfaction and thus have little or no credibility (Bannister, 2007). The UN survey identifies and analyses critical factors to increase citizens' use of e-services, although this is not exactly measuring adoption. It never mentions the city level and, in particular cities provided e-services. It is very little relevant to local e-government, beyond providing an understanding of the trends of e-government worldwide as a framework.

However, cities are important poles of human activity (cultural, intellectual and economic) that are gaining population and weight in the global economy at an impressive pace. They play a central and key role in e-government services provision by offering a rich variety of e-services, more than any other public administration. Cities deserve and need specific benchmarking methodologies.

Cities across the world are not comparable just because they are cities. The comparison of local e-administration at an international level is extremely difficult due to the different roles that cities play in different countries, making it impossible to take a top-down approach (United Nations, 2010). This fundamental characteristic should be taken into account when designing a benchmark to avoid misleading results (Bannister, 2007). Therefore, at international level, the focus should be put in benchmarking similar services delivered rather than similar organizations (Jansen, de Vries and van Schaik, 2010). But despite the diversity in socio-economic environments and contexts that makes comparing performance across cities difficult (Cole and Parston, 2006), there is scientific evidence of commonalities among cities at the international level when referring to e-administration (Gallego-Álvarez, Rodríguez-Domínguez and García-Sánchez, 2010). Thus, there is room for cities e-administration benchmarking, but it should consider strongly a set of common e-services. While this set should include the most important services each city provides, including, as much as possible, all the local e-services offered is important as well to compare cities. The way that the set of core services is built can be bottom-up or top-down. Examples of the latter are benchmarking methodologies that build the set of services from the legal framework that establishes which services a city administration must provide (Shackleton, Fisher and Dawson, 2004). This approach presents two problems. One is that those services, although mandatory, are usually not the most interesting for municipalities in the current e-government transformation and will be even less relevant in the near future (Löfstedt, 2007). Another issue is that cities cannot compared at an international level with quite different legal frameworks, since number of services to be compared is reduced with the consequent loss of interest.

As previously cited (United Nations, 2010), the bottom-up process appears to be the most suitable one, and it was done in the Municipal E-Government Assessment Project (Kaylor, Deshazo and Van Eck, 2001). This is a survey focused on US cities and what they provided in terms of e-services. Researchers performed a field research based on the actual service provision, and identified the set of common services to be compared. From this first benchmark, the authors defined a methodology called MeGAP-3 that has been applied with minor variations to a couple of other geographic regions, such as Norway (Flak, Olsen and Wolcott, 2005) and Turkey (Arslan, 2007).

The set of services can be built through field research, as in MeGAP-3, or through a participatory process involving the municipalities themselves. This last option ensures their interest in the benchmark because all the participants have been engaged in its design. Moreover, this approach is key to ensure the

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 61

usefulness of the results, which still is one of the main challenges when defining a methodology for local e-government benchmarking. Thus, the paper adopts the latter strategy.

As a first step for the bottom-up process, a survey was performed within the EUROCITIES (http://www.eurocities.eu) Knowledge Society Forum members. 17 representatives interested in a cities e-services benchmarking participated. It gathered the basic requirements for a benchmarking exercise to be useful to the cities. It turned out that city representatives were interested in comparing their respective city with a quite diverse sample of medium- and large-sized cities. The results should avoid the presentation of a ranking of cities, and an aggregated index was thought of as of little interest. The survey should maximize the learning aspects of a benchmarking exercise rather than fostering a nonsensical competition amongst cities. The output should facilitate the identification of the areas where the organizations need to improve as well as those in which they excel. It should help to identify organizations that have a similar service offer. In addition, longitudinal studies should be possible through periodic measurements. Finally, it should identify good practices that could bring a substantial improvement to the service offer. The survey was useful to engage a number of cities in the actual benchmarking exercise that followed, but, on the other hand, confirmed the key traits a cities benchmarking should have and the paper has been discussing.

In summary, the most important e-government benchmarks from the perspective of local e-administration have been reviewed. Little research attention has been given to this area, where not a lot has changed since this was remarked by (Lanvin and Lewin, 2006). Key aspects have been identified, and the field needs more research to strengthen and make more systematic the local e-government benchmarking, and to make it more fit to the needs of city managers.

Thus, a new methodology to benchmark local e-administration was proposed and applied with the participation of 15 European cities.

3. RESEARCH DESIGN AND METHODOLOGY

Drawing from the requirements synthesized after the questionnaire circulated among the EUROCITIES forum mentioned, and the lessons learnt from discussing the most relevant e-government benchmarks, a specific benchmarking methodology to evaluate and compare e-services in European local public administrations was defined and experimented. It was named Bench-learning Methodology (from here on BLM), stressing its focus on cities learning from each other.

The BLM methodological approach includes: (i) Identifying the services to be benchmarked; (ii) Classifying the services into standard and additional; (iii) Building the categories of services and creating the catalogue of services; (iv) Collecting data of service provision, service maturity and service adoption; (v) Analysing data and building visualizations, and (vi) Building the good practices list.

The specifics of the first three items are dealt with in the next subsection; (iv) and (v) require a very detailed discussion of how to measure different aspects in a meaningful way, the reliability of the data collected, the transformation of data into indicators which fit the requirements and goals previously discussed, and how to identify good practices, and all this is the content of subsections 3.2 and 3.3.

3.1. The Catalogue of Services

The catalogue of services is the set of services that will be used to measure and compare how local governments are performing. It includes the most important services provided by the public administrations.

An iterative bottom-up process started by asking each city to list the most important services, giving 15 as an indicative number. Beyond kicking off the process to build the catalogue, this ensures that the most important services for each city are taken into account. The lists are then analysed and merged into a single list,

62 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

where semantic problems (Klischewski, 2003a) are detected and solved: namely, similar services names with different meanings and implications in different countries are disambiguated, and equivalent services under different names should be identified. Both aspects are very important when making international comparisons where organizations are run under different legal frameworks, as Bannister (2007) and Cole and Parston (2006) pointed out.

The resulting list (81 services, based on the 15 initial ones provided by each city) is circulated among all participants which should indicate whether their organizations are providing the different services – which provides another check of the list (see the Appendix). The results of this second round are merged and the number of cities that provide each service is added. These services are then classified into standard (provided by more than 50% of the cities) and additional services (shared by less than 50% of cities), supporting thus the need of a core list for comparison, and additional ones, for a richer assessment. Finally, the services are grouped according to areas of interest or categories (Table 1), as this strategy, which corresponds to the usual city governance structure, makes more readable the results for city managers.

In summary, the catalogue organized in categories with the standard services constitutes the main basis for comparison, with an extended catalogue with the additional ones for refinement. Because of the construction process, the catalogue should be rebuilt when repeating the benchmarking exercise.

3.2. Data Collection and Assessment of Provision, Maturity and Adoption

The survey data is collected through self-evaluation questionnaires that are filled in by the responsible of e-administration in each city and the responsible of each of the services within the respective city (see the Appendix). The use of such questionnaires is accompanied by specific training sessions to unify the assessment criteria

Table 1. Categories

Category	Description
Channelling	Enhance the contact between the citizenship and its municipality. It includes city websites, personal folders or bulletins.
Citizens' Engagement	Satisfy citizens' expectations, attract their attention and consolidate bonds, to encourage the relationship between the citizens and their administrations promoting or being in themselves a pre-stage of e-democracy.
Education	Satisfy citizens' educational needs. It includes services related to children, adults and virtual learning services, cultural projects and libraries.
Employment and Business	Help citizens to get a job, facilitate business procedures, recruitment, tendering and small business promotion.
Environment	Environmental care, including rubbish collection and maintenance of the communal properties as well as encouragement of habits related to sustainable urban growth.
Life-cycle	Transactions among citizens and municipalities related to their daily life, such as personal certificates, digital documents management systems or census.
Social Care	Public health and social care providers, including housing services and care for people with special needs (disabled, children or the elderly).
Transport	Citizen's mobility needs.
Urban Planning	Land use and property issues like construction permits, building regulations, certificates or land acquisition.

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 63

across persons and cities. The validity of this approach in relation to the available literature is discussed below.

The first data collected are on service provision. When building the services catalogue it was already remarked that its provision by cities is immediately registered and the proportion of the cities is the first indicator, called Service Coverage. It is measured as a percentage of the cities providing the service, and allows to decide whether it is considered standard (over 50%) or additional (below 50%). When a service is shared by all the cities its Service Coverage is 100%.

By averaging Service Coverage per category, another useful indicator, Category Coverage, is measured. In a category where all cities are providing all its services, the variable takes the value 100%. Thanks to Category Coverage researchers learn up to which extent a category, that represents an area of responsibility within the management of the city, is solved by the same pack of services across all surveyed cities.

An analysis of the provision of the extended catalogue of services reveals additional information about the e-administration, as it allows us to understand how cites are complementing the standard services with other services, sometimes targeted at local specificities, usually more advanced, innovative and appealing. To measure how aligned cities are in their overall offer within a category BLM uses the metric Diversity, defined as the complementary of the category coverage of the extended catalogue (Diversity = 1 - Category Coverage of Extended Catalogue/100). Diversity always takes a value between zero and one. When all the cities are providing the same services within a category the Diversity is 0, and the Category Coverage is 100%. These indicators not only measure and compare the provision of e-services but also offer information about how different city management areas are aligned across the sample, which takes on a special importance in international benchmarking.

Data on services maturity is collected next to get a further qualification of the provision. All the services included in the catalogue are assessed in terms of maturity or sophistication using an e-government stage model. The model used is based on the Gartner one (Baum and Di Maio, 2000), extended with a 5th level to take account of the use of web 2.0 technologies that improve the user experience by increasing the users interaction and participation in service provision. These new functionalities allowing citizens participation in the services provided, quality evaluation and discussion about services improvement require an extra level of sophistication in the maturity scale of service provision (See Table 2).

The third set of data collected is citizens' adoption of the e-services. Measuring services adoption, including non electronic ones, is not

Table 2. Maturity levels

1	Information	Ability to offer relevant information in a basic provision process, usually website based.
2	Interaction	Users can generate basic content -email, queries- which is introduced in the government databases. It means a one-way interaction process in which the user can start but not complete a procedure on-line. Physical attention at the municipal counters is still required.
3	Transaction	The achievement of this two-way interaction level implies the possibility to completely perform a service –payments, certificates- through the use of electronic means.
4	Transformation	Full availability on-line, implying a full integration of all e-government services into a single portal. Users can access all the services from a single virtual office from anywhere. This level usually implies a business process re-engineering both in the back office and the front office.
5	Participation	Rich user interaction thanks to the use of web 2.0 technologies in the services delivery. Users can participate in the services provision so that their opinions enhance service quality and effectiveness.

64 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

easy, as they are widely heterogeneous, from public transport used everyday, through taxes payment used every year, to some used seldom over a life time. The citizens' adoption of an e-service might be objectively defined as the ratio of the e-service requests versus the total service requests on all the different channels through which the service is offered. As it has been already indicated, the importance of measuring adoption is acknowledged by OECD, UN and EU in their surveys. Up to now, most studies measure citizens' perception of usefulness or quality of the e-services, as well as of other characteristics (Gauld, Goldfinch and Horsburgh, 2010; Shareef, et al., 2011; Lin, Fofanah and Liang, 2011). But the real use of the e-services rather than the motivations to use them or even the user's satisfaction are most relevant. OECD, UN and EU concluded that after their recent and preliminary efforts that an international consensus on suitable measurements in that matter is still lacking. First of all, the share of services actually provided through electronic means is not being widely used. Cities measure the use of e-services through website visits or even transactions performed, but rarely compare those indicators with those of other channels (phone calls, face-to-face attention, etc.). Second, the use of an e-service should be measured in a different way across maturity stages (Shareef, et al., 2011). While an informational service (level 1) can be measured through the number of web pages served, a transactional service (level 3) needs to count the number of finalized transactions.

Undoubtedly, there is a need of research to define a more objective set of metrics to solve the difficulties of measuring adoption (Löfstedt, 2005). This goes beyond the scope of this paper. Meanwhile, BLM took a pragmatic approach based on assessing the citizens' adoption perceived by the person in charge of the service. This is estimated by comparing the actual service use versus the initially expected use. A framework based on a five level Likert scale helps the rating process by city officials (Table 3). In addition, researchers organized training sessions to unify the assessment criteria across persons and cities and reduce subjectivity. Although based on a subjective measure, it allows to introduce the comparison of services based on maturity and adoption, and was later on adopted by (CapGemini, 2009).

3.3. Further Data Analysis, Results Presentation and Good Practices

As indicated, the data gathered are analysed first by service and then aggregated by category. Averages for maturity and adoption are calculated per service and are descriptive statistics good enough for a set of 15 cities. Outstanding services in coverage, maturity or adoption are double-checked by independent experts. The assessment process is reviewed, and interviews are performed when needed, to ensure the consistent use of the assessment frameworks. The results presentation, which differs largely from their usual aggregation into a single index and corresponding ranking deserves detail.

Table 3. Adoption levels

1	No adoption	The service has been a complete failure and the municipality is considering its withdrawal.
2	Low adoption	The service is being used by fewer citizens than previously expected.
3	Medium adoption	The service is being used by the average number of citizens expected. Some citizens shifted to the electronic channel.
4	High adoption	The service is being widely used among the citizenship. It becomes an accepted option for the service provision.
5	Excellent adoption	The service has been a complete success making a clear contribution to the electronic channel shift.

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 65

After this double-check of the experimental data, global averages are calculated and results presented. Initial charts show the averages of maturity and adoption for all the categories surveyed (Figure 1). Besides showing the average value for each category, these charts provide an overall view of the local e-government degree of development, as the user can grasp a general mark for maturity. The charts facilitate comparing maturity among categories, making visible potential harmonization in services provision. They help to discover correlations between maturity and adoption, which are measured in two very different ways, the former objectively in terms of level of service provided, the latter relates to its use by citizens.

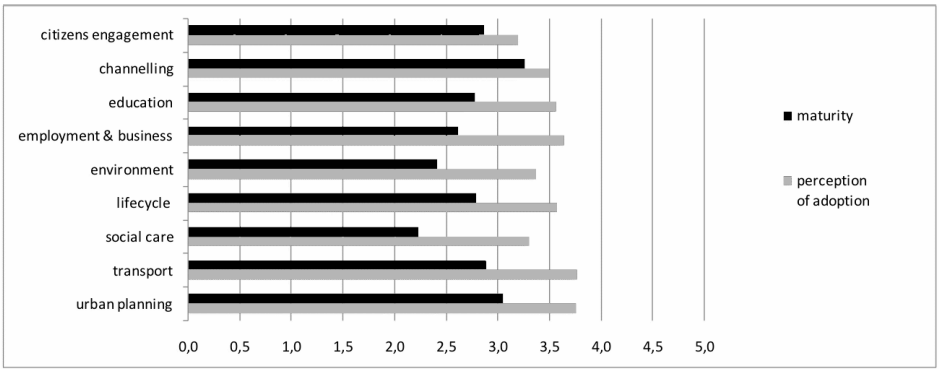
Each city is analysed with respect to the global results. Its results are presented through two charts, for maturity and for adoption, respectively, each comparing the city with the survey average across each category of the service catalogue (Figure 2). With these "city maps" each city can see in which categories scores above average and in which ones it needs to improve.

This city profile is further characterized by Lambda, defined as the difference between the highest and the lowest mark in service maturity. Lambda indicates the coherence in e-government development across all nine categories. A low mark would mean that the city is offering a quite homogeneous set of e-services, while a high mark implies that rather advanced categories coexist with rather undeveloped ones. Once a category that a city needs to improve is identified, a natural step is to look for inspiration in outstanding services in the given category provided by other cities. BLM puts forward good practices, i.e., those services that stand out when maturity and adoption marks are high. To help identifying them, BLM uses the indicator Rho, defined as the distance between a service maturity and the average service maturity in a given category. Grouping the services per category and sorting the list by Rho and adoption, good practices appear at the first positions in each category: they are services in specific cities that are most successfully adopted by citizens and are of highest in maturity level. City managers then know who to ask or where to look for information of a more mature service successfully adopted.

4. RESULTS. THE PILOT SURVEY

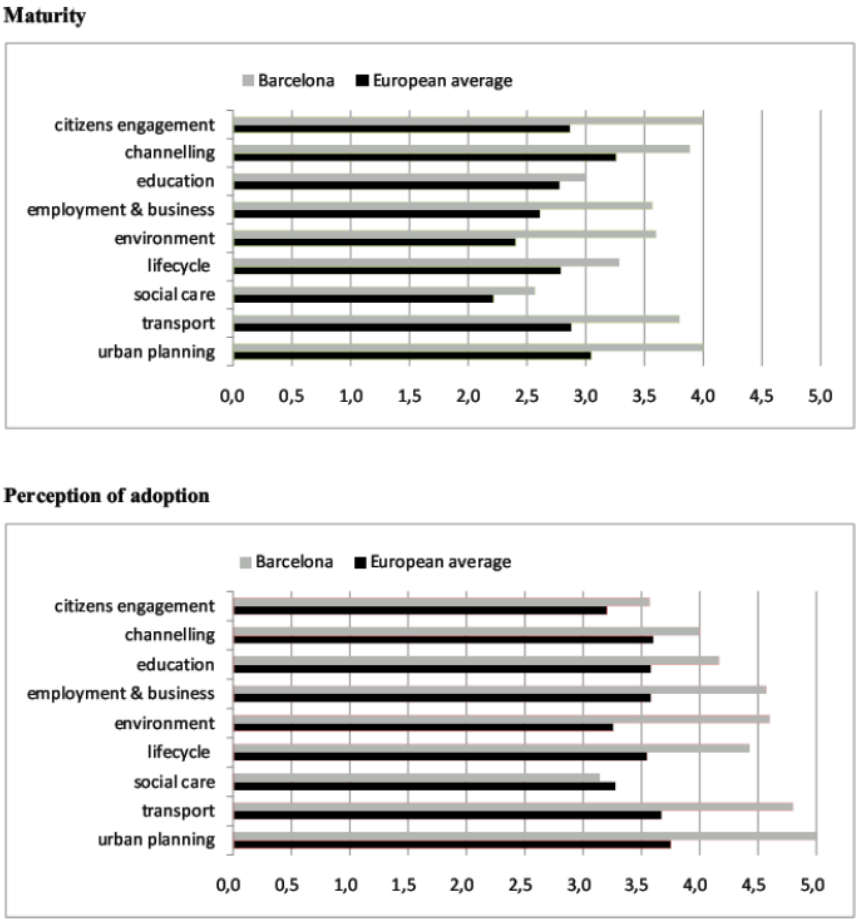
The Bench-learning methodology needed to be tested in the field, because of its bottom-up, participatory approach, and this took place through a pilot survey performed during 2008 and 2009 within the Knowledge Society Forum of the European network of cities EUROCITIES (Batlle, Calderón and López, 2009). The

Figure 1. Global maturity and adoption map



66 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

Figure 2. City maturity and adoption map



survey results summarized here should allow the reader to grasp better the outcomes of the application of BLM, and focus on the validation of the methodology, rather than being a survey of European local e-government.

Fifteen cities volunteered to take part in the survey (Table 4). The participation involved some costs, such as personnel time, meetings, etc., which were not high, but required interest and active participation, and were committed through subscription. The group included some capital and second cities belonging to ten countries of the EU27, and represents 2% of its population. It involved medium and large cities from the North, South, East, Centre, and West of Europe. The parameters shown in the table reflect quite wide variations across the different cities. For a pilot test, the cities looked quite diverse and representative of the European urban reality, excluding small cities or villages. Of course, no claim to statistical significance even at a European level is made.

The resulting catalogue comprised 53 services shared by more than 50% of the cities, and 28 additional ones, i.e., 65% and 35% of the 81 services, respectively. The services were grouped in 9 categories as shown in Table 5. 743 implementations of services were analysed.

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 67

Table 4. Participant cities (data provided by each city)

	Inhabitants	Population with University Degree	Population Average Age	Household Internet Access	Per Capita GDP	Civil Servants
Antwerp	464.038	12,90%	39,25	65,00%	30.000	7.949
Barcelona	1.595.110	21,30%	43,00	60,70%	25.651	13.393
Bergen	250.985	31,00%	38,30	64,00%	60.322	17.123
Bilbao	354.180	17,00%	44,00	45,70%	19.648	2.504
Birmingham	1.000.600	22,40%	33,00	55,00%	23.213	57.000
Bologna	372.256	26,20%	47,70	55,60%	35.156	4.926
Enschede	155.000	6,00%	38,30	83,00%	25.200	1.700
Helsinki	560.994	28,30%	40,00	85,00%	27.258	38.623
Milan	1.304.263	17,00%	37,00	43,00%	39.442	17.640
Murcia	422.861	11,10%	37,00	39,40%	20.312	2.058
Rijeka	144.043	18,49%	41,20	45,00%	12.305	455
Tallinn	401.372	43,40%	n.p.	67,90%	16.576	1.664
The Hague	475.904	34,00%	38,10	91,00%	12.400	7.850
Turin	908.263	9,00%	44,90	50,00%	19.604	12.000
Vienna	1.677.867	33,00%	41,00	65,30%	29.449	29.449
Average	672.516	22,07%	40,20	61,04%	26.436	14.289

n.p.: not provided

Table 5. Categories

Category	Standard	Additional	Coverage	Diversity
Channelling	8	2	82.22%	0.45
Citizens' Engagement	6	4	80.83%	0.26
Education	9	4	77.78%	0.32
Employment and Business	5	2	76.00%	0.35
Environment	5	2	80.00%	0.30
Life-cycle	8	2	67.50%	0.39
Social Care	6	8	80.00%	0.52
Transport	3	3	75.56%	0.46
Urban Planning	3	1	82.22%	0.32

The initial global charts mentioned before (Figure 1) show a maturity average just below 3 (the transactional level). It means that the majority of e-services did not allow citizens to complete the service by electronic means. Adoption average was slightly higher, above 3, and even above 3.5 for six out of the nine categories. This means that e-services were perceived as being used by more people than initially expected or targeted. The graphic

68 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

presentation suggested that little correlation between maturity of e-services and their adoption.

The city profile/map, exemplified by Barcelona, Figure 2, illustrate a results presentation widely differs from the usual position within a ranking derived from benchmarks summarised into a single index. They promote better and deeper understanding in maturity and adoption of e-services, through their positioning with respect to average, and through presenting the diversity across the categories of the catalogue.

The first good practices identification was made taking services with Rho at least 1 (one step above average maturity) and adoption higher than 3. This list included 95 services implementations. Table 6 presents the 30 highest ranked, outstanding in maturity and adoption, where cities can turn to to improve their e-services offer in a category found as below average in the profile.

For instance, 9 successful additional services appear on Table 6, that could be considered by other cities when looking for improving their offer: Enterprise folder (Bologna and Enschede), Lost and Found (Vienna), e-Learning (Birmingham and Helsinki), Media Workshops (Helsinki), Ideas Bank for entrepreneurs (Barcelona), Pollution charge for private vehicles (Milan), Web Flea Market (Barcelona and Vienna), Municipal bikes lending (Barcelona and Vienna) and Acquisition of land by foreigners (Enschede and Vienna).

5. THE PILOT SURVEY REVISITED

The years following the completion of the pilot survey have seen a so called 'fiscal consolidation' related to the economic crisis in Europe, and a dramatic shortening of resources in most European local administrations. It was not a time especially favourable to continue the activities related to extending BLM and translate the lessons learned to a larger scale, and to address other local administrations, such as small cities and villages – approaches to some of their organisations were not successful.

BLM is centred on a type of users, namely, city managers. Three years after the public presentation of the results of the survey, a questionnaire was circulated among the city managers who took part, or the new responsible persons. The initial results show that the survey mainly helped to identify cities with a similar e-government profile, learn new functionalities and richer interaction levels for e-services and identify good practices where to learn from. The key goals of the BLM, which innovate with respect to previous benchmarks, appear clearly in the answers to the questionnaire.

The main benefits for cities have been in identifying strengths and weaknesses and planning better the next improvements in the e-service offer. The majority of the respondents stated that the BLM pilot survey results were used to start improvements in Channelling, Engagement, Environment, Social Care and Transport and Mobility. Environment and Transport and Mobility are the categories in which cities learned the most from the good practices list.

In general, self-evaluation was well accepted to assess service provision and adoption but not for maturity, where the respondents requested improvements. Finally, city managers suggested that improvements in the visualisation of the service coverage information and in the city maps would make BLM results more useful.

6. DISCUSSION

BLM was designed to understand better how local governments perform in e-administration, providing a richer picture while hiding irrelevant detail, and allowing to easily identify good practices that could be used to improve e-services. As it reinforces the 'learning' dimension of the benchmarking exercise, it has been named a "bench-learning" methodology. From the perspective of research into local e-government, BLM introduces significant innovations compared with current benchmarking methodologies, and when implemented provides more useful findings. BLM is more useful for local

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 69

Table 6. Good practices list (Rho 1,5 or bigger and adoption 4 or bigger)

Category	Service	Rho	Adoption	City
Channelling	City's homepage	1,6	5	Bologna
Channelling	City's homepage	1,6	5	Helsinki
Channelling	City's homepage	1,6	4	Turin
Channelling	GIS and virtual flight	1,6	5	Helsinki
Channelling	GIS and virtual flight	1,6	4	Turin
Citizens' engagement	Participation processes	1,8	5	Rijeka
Citizens' engagement	Participation processes	1,8	4	Barcelona
Citizens' engagement	Participation processes	1,8	4	Enschede
Education	Cultural heritage sites	2,4	4	Helsinki
Education	e-learning	1,5	5	Birmingham
Education	e-learning	1,5	5	Helsinki
Education	Pre-school children education	1,8	5	Bergen
Education	Pre-school children education	1,8	5	Milan
Employment&business	Public Tenders (jobs in public sector)	2,5	5	Helsinki
Employment&business	Public Tenders (jobs in public sector)	1,5	4	Bologna
Environment	Air quality	1,8	4	Milan
Environment	Bulky waste collection	1,7	5	Barcelona
Environment	Pollution charge	1,7	4	Milan
Environment	Recycling parks	3	4	Helsinki
Life-cycle	On-line fines consult and payment	1,8	5	Bologna
Life-cycle	Residence registration	1,5	5	Enschede
Life-cycle	Residence registration	1,5	5	Tallinn
Life-cycle	Residence registration	1,5	4	Turin
Social care	Housing for low incomes	1,9	5	Helsinki
Social care	Organizing public events	1,7	4	Enschede
Social care	Physicians database	1,9	5	Barcelona
Transport	Public transport services	2,2	5	Helsinki
Transport	traffic web cameras	1,9	4	Rijeka
Transport	traffic web cameras	1,9	4	The Hague
Urban planning	Acquisition of land by foreigners	2	4	Vienna

e-government practitioners as shown in the previous section, which also reveals that there is still room for improvement.

From a more academic perspective, the benchmark is based on the comparison of similar services (Jansen, de Vries and van Schaik, 2010). The existence of such similar local e-services must be shown beforehand, and BLM process starts by defining a suitable catalogue of shared services. This catalogue is developed following a bottom-up process, as suggested by UN (2010) with participation involving the cities themselves, rather than based on field research as in (Kaylor, Deshazo and Van Eck,

2001). 65% of the services of the resulting catalogue were shared by more than 50% of the cities, and thus, the comparison of cities based on similar services is possible. Moreover, these figures are consistent with the findings of (Gallego-Álvarez, Rodríguez-Domínguez and García-Sánchez, 2010) on the existence of commonalities among cities at the international level when referring to e-administration.

In addition, the extended catalogue, with another 35% of the 81 services, helped to get a deeper understanding of the services innovation carried out by cities as a consequence of governance innovations (Hartley, 2005) or technological ones. The examples were related with targeting, personalisation, aggregation or the use of specific new technologies such as Web 2.0 (Anttiroiko, 2010).

The services catalogue could be improved through a more accurate definition of categories. Semantic web technologies might help establishing a common ground for semantic interoperability by bringing in public services ontologies that formalize service definition and contribute to the identification of different domains of interest (Klischewski, 2003b) that can be mapped with categories.

BLM uses an extended model of services maturity to be able to assess more deeply their provision. It is based on a well-known Gartner's e-government stage model (Baum and Di Maio, 2000) extended with a fifth level (Lee, 2010). A significant number of services (12 out of 81) were found in that maturity level, demonstrating that it was needed. Nevertheless, the use of Gartner's stages model needs to be revised. Actually, CapGemini stages describe e-services maturity levels better, although it also needs a revision to take account of the use of web 2.0 technologies in e-services provision. However, ICT sophistication is a moving target, and improvements in measuring maturity was one of the points whose improvement suggested city managers. These models need even more strongly updating.

Although BLM does not solve the lack of commonly accepted measures of adoption, it proposes an innovative approach to tackle the absence of objective adoption information, through perceived versus expected adoption. It offers (limited) adoption measures, always recognized as very important although very uncommon. Three years after presenting the results of the first pilot survey, measuring the number of web visits, forms downloaded, and transactions is becoming more extended although not yet widely adopted by cities. This is positive, although, as previously indicated, these measures are not completely appropriate for adoption. Improving the adoption measurement framework and measuring process should be a priority in future research.

BLM uses surveys to collect data. Cities are mostly happy with this method but suggest that it should be improved for maturity assessment. This cost-effective method is widely used, although it should be carefully checked to avoid misleading results (Bannister 2007). Researchers are currently taking complementary measures such as, for instance, creating small assessment projects with a multidisciplinary team of people from each participant organization (Valdés, et al., 2011), providing intensive training to assessors, or using statistical methods to discard some of the answers (Lin, Fofanah and Liang, 2011; Gauld, Goldfinch and Horsburgh, 2010; Shareef, et al., 2011). To increase the data quality, BLM defined two measurement frameworks to assess maturity and adoption based on a 5-point scale easy to apply. In addition, an ad-hoc training on how to apply the model to assess the maturity and adoption was provided to all cities to avoid misconceptions. Finally, independent evaluators sampled and checked the maturity marks of the outstanding services.

BLM does not offer a numerical indicator as a final result, with a consequent ranking. It provides varied indicators to measure coverage, provision, adoption, coherence within a city, excellence, etc. Its visualizations help to understand these indicators within global development of e-administration, within a catalogue of services, supporting the perception of correlations. Most of these indicators and

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 71

visualizations are new in the framework of the analysis of e-government. Their use provided decision-makers with a valuable insight, for instance, to identify where they were performing better and worse with respect to the average and launch better services.

Improvements in the visualization of the service provision have been suggested by managers revisiting the survey. Although useful, they could be improved with the introduction of new charts, such as spider charts (or radar charts) instead of bar charts (CapGemini, 2009). Then the city performance and the sample average can be shown at the same time allowing quick comparisons and making strengths and weaknesses more visible.

The methodology provides the cities with a list of good practices, the most successful services of each category, and the cities that are providing them. Unlike widespread approaches, the list is based on objective indicators, and hints at good practices which city managers should look at with greater detail, to learn from and improve their e-services offer. This should be followed by managerial decisions about the most appropriate services to be implemented according to each city's characteristics and strategy.

Some limitations of BLM have been uncovered by the target group of users themselves when revisiting the survey. Further limitations could be revealed when benchmarking small cities and villages, which were absent from the pilot; and as the pilot survey cannot claim to be representative, when performing a much more extensive survey. The authors intended to continue the pilot with a larger survey at the European level, and with an extensive one covering small cities and villages in a specific region (Catalonia). This would have increased statistical significance, but, more importantly, allowed a more refined segmented analysis according to different city characteristics. The difficulties faced by European public administrations in the period after the pilot survey are the main causes of this gap still pending to be filled.

7. CONCLUSION

BLM guides benchmarked organizations through a non competitive learning process that finalises with the identification of potentially good practices for each of the service categories, that are prone to be used as accelerators in the process of implementing and improving local e-services. In the process, an important number of intermediate results help city managers to understand the position of their organizations in different areas of e-services and open up different working lines for improvement. The results promote the understanding of each city in the overall context of e-government development and adoption, never making a direct comparison of a city against another.

The research reported in this paper presents new insights for the international e-administration benchmarking of cities, especially when oriented to the improvement of e-administration. Specific innovations are: 1) comparing similar services instead of similar organizations; 2) working with a catalogue of common services and including the analysis of advanced services to deal with innovation trends; 3) building up this catalogue bottom-up from city managers surveys; 4) including citizens' adoption as a measure and relating it with service maturity (measuring provision), while discussing and suggesting suitable adoption measures; 5) introducing a variety of indicators instead of an aggregated index and subsequent competitive ranking; 6) profiling each city against a variety of global averages; 7) innovative meaningful visualizations of the indicators; and 8) objective indicators leading to qualified lists hinting at good practices.

BLM is grounded on a discussion of the most relevant (according to the authors' own extensive survey) contributions of the literature in benchmarking e-administration. On the other hand, it is heavily user centred, making use of city managers' requirements and thus goes beyond traditional academic oriented surveys, which are not useful enough for practitioners (Janssen and Wagenaar, 2004; Heeks, 2006; Bannister, 2007).

When cities provide an overwhelming majority of the services to the citizens, and almost all e-administration benchmarks are focused at the national level, where very few services are provided, BLM contributes to fill the gap of the existing lack of benchmarking studies of local e-government, and specifically in Europe. At the same time, it is one of the few methodologies that provides a number of innovations allowing a diverse and detailed analysis of (local) e- administration. BLM was tested through a pilot survey among 15 local government organizations in 10 European countries with rather different legal frameworks, the results proving its suitability as a methodology. It is also a suitable tool for practitioners to learn from those cities that are doing things better, which is key to e-government success (Janssen and Wagenaar, 2004).

REFERENCES

Anttiroiko, A. (2010). Innovation in democratic e-governance: Benefiting from web 2.0 applications in the public sector. [IJEGR]. International Journal of Electronic Government Research, 6(2), 18–36.

Arslan, A. (2007). Turkish local e-governments: A longitudinal study. The Electronic. Journal of E-Government, 5(2), 95–106.

Bannister, F. (2007). The curse of the benchmark: An assessment of the validity and value of e-government comparisons. International Review of Administrative Sciences, 73(2), 171.

Batlle, J., Calderón, R., & López, J. (2009). Local e-government bench-learning survey. Brussels: EUROCITIES. Available at: <http://www.eurocities.eu/eurocities/publications/eGovernment-Benchlearning-final-report-WSPO-8PM4ET> [Accessed 24 October 2013].

Baum, C., & Di Maio, A. (2000). Gartner's four phases of e-government model. Stamford, Ct. Gartner Group, 21, 12–6113.

CapGemini. (2003). Online availability of public services: How is Europe progressing. Brussels: European Commission.

CapGemini. (2009). Smarter, faster, better e-Government. 8th e-Government benchmark measurement. Brussels: European Commission.

CapGemini. (2013). Public Services Online: Digital by Default or by Detour? Assessing User Centric eGovernment performance in Europe – eGovernment Benchmark 2012. Brussels: European Commission.

Cole, M. I., & Parston, G. (2006). Unlocking public value: A new model for achieving high performance in public service organizations. John Wiley & Sons.

Flak, L. S., Olsen, D. H., & Wolcott, P. (2005). Local E-government in Norway. Scandinavian Journal of Information Systems, 17(2), 41–84.

Gallego-Álvarez, I., Rodríguez-Domínguez, L., & García-Sánchez, I. (2010). Are determining factors of municipal E-government common to a worldwide municipal view? an intra-country comparison. Government Information Quarterly, (27): 423–430.

Gauld, R., Goldfinch, S., & Horsburgh, S. (2010). Do they want it? do they use it? the demand-side of e-government in Australia and new Zealand. Government Information Quarterly, 27(2), 177–186.

Griffin, D., Foster, A. & Halpin, E. (2004). Joined-up e-government: An exploratory study of UK local government progress. Journal of Information Science and Technology, 2

Hartley, J. (2005). Innovation in governance and public services: Past and present. Public Money and Management, 25(1), 27–34.

Heeks, R. (2006). Understanding and measuring e-Government: International benchmarking studies. Paper presented at the UNDESA Workshop E-Participation and E-Government: Understanding the Present and Creating the Future, Budapest, 27-28.

Hicks, R. (2010). Korea Tops UN Recession-Time E-Govt Rankings. Available at: <http://www.futuregov.asia/articles/2010/jan/20/korea-□rst-asian-nation-top-un-e-govt-rankings> [Accessed 11 September 2013].

Holzer, M., & Kim, S. T. (2007). Digital governance in municipalities worldwide (2007). A longitudinal assessment of municipal websites throughout the world. Newark, New Jersey: The E-Governance Institute. National Center for Public Performance. Rutgers University.

Jansen, J., de Vries, S., & van Schaik, P. (2010). The contextual benchmark method: Benchmarking e-government services. Government Information Quarterly, 27(3), 213–219.

Janssen, D. (2003). Mine's bigger than yours: Assessing international e-government benchmarking. Paper presented at the 3rd European Conference on e-Government, MCIL, Reading, MA, 209-218.

Janssen, M., & Wagenaar, R. (2004). An analysis of a shared services centre in e-government. Paper presented at the Proceedings of the 37th Annual Hawaii International Conference on System Sciences, Hawaii. 10.

Kaylor, C., Deshazo, R., & Van Eck, D. (2001). Gauging e-government: A report on implementing services among American cities. Government Information Quarterly, 18(4), 293–307.

Klischewski, R. (2003)a. Top down or bottom up? How to Establish a Common Ground for Semantic Interoperability within e-Government Communities. In E-Government: Modelling Norms and Concepts as Key Issues, Proceedings of 1st International Workshop on E-Government at ICAIL (pp. 17-26).

Klischewski, R. (2003)b. Semantic web for e-government. Electronic government (pp. 288-295) Springer.

Kunstelj, M., & Vintar, M. (2004). Evaluating the progress of e-government development: A critical analysis. Information Polity, 9(3), 131.

Lanvin, B., & Lewin, A. (2006). The next frontier of E-government: Local governments may hold the keys to global competition. Global Information Technology Report, 2007, 51–63.

Lee, J. (2010). 10 year retrospect on stage models of e-government: A qualitative meta-synthesis. Government Information Quarterly, 27(3), 220–230.

Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success. Government Information Quarterly, 28, 271–279.

Löfstedt, U. (2005). E-government–assessment of current research and some proposals for future directions. International Journal of Public Information Systems, 1(1), 39–52.

Löfstedt, U. (2007). E-government services in local governments-a study of development in Swedish municipalities. Journal of Organisational Transformation and Social Change, 4(2), 157.

OECD. (2007). Working Paper "E-government as a Tool for Transformation", [GOV/PGC(2007)6], background paper for a meeting at de OECD in Paris, 28 March 2007. Available at: <http://search.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=GOV/PGC(2007)6&docLanguage=En> [Accessed 24 October 2013].

OECD. (2009). Rethinking e-government services. Organisation for Economic Co-operation and Development; 10.1787/9789264059412-en

Shackleton, P., Fisher, J., & Dawson, L. (2004). Evolution of local government E-services: The applicability of e-business maturity models. Paper presented at the 37th Annual Hawaii International Conference on System Sciences, 5-8.

Shareef, M. A., Kumar, V., Kumar, U., & Dwivedi, Y. K. (2011). e-Government adoption model (GAM): Differing service maturity levels. Government Information Quarterly, 28, 17–35.

UN. E. (2012). government Survey (2012) E-Government for the people. Department Economic and Social Affairs, United Nations, New York. Available at: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf> [Accessed 24 October 2013].

United Nations. Department of Economic. (2010). United Nations e-government survey 2010: Leveraging e-government at a time of financial and economic crisis (Vol. 2). United Nations Publications.

Valdés, G., Solar, M., Astudillo, H., Iribarren, M., Concha, G., & Visconti, M. (2011). Conception, development and implementation of an e-government maturity model in public agencies. Government Information Quarterly, 28, 176–187.

Whitmore, A. (2012). A statistical analysis of the construction of the united nations E-government development index. Government Information Quarterly, 29(1), 68–75.

74 International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014

Joan Batlle-Montserrat is Assistant Director at the Department of Creativity and Innovation and is the former Head of e-Government International Cooperation of the city of Barcelona. Graduated in Physics from University of Barcelona. Masters in Management of Information Technology (Ramon Llull University) and Masters in Digital Information and Documentation (University of Barcelona). Author of some papers and books on e-Government and Invited Professor of the Masters on e-Government of the Pompeu Fabra University (Barcelona). He is currently developing the PhD thesis in "Information and Documentation in the Knowledge Society" at the University of Barcelona under the direction of Professor Abadal and Professor Blat.

Josep Blat is Professor of Computer Science at Pompeu Fabra University (Barcelona). He founded its Engineering School and ICT Department, and was head of both. Graduated from València, got his PhD from Heriot-Watt, Edinburgh, and was post-doc at Université Paris-Dauphine. He was head of the Maths & CS Department at Universitat de les Illes Balears for several years. He leads a research group in Interactive Technologies (http://gti.upf.edu) with activity in graphics, HCI and e-learning, and extensive research and technology development in European projects, with a focus on media technology research, coordinating Digital Cinema projects such as IMPART, iMP, IP-RACINE and Speed-FX (IST prize). A very successful activity has been the Barcelona World Race Game development. (More information: http://gti.upf.edu).

Ernest Abadal is a Professor of the Faculty of Library and Information Science of the University of Barcelona. Degree in Philosophy, Library and information science and PhD in Information sciences. Author of several books and papers on digital publications and open access to science. Director of a research project about open access in Spain (www.accesoabierto.net). Member of "AIB Studi", "El profesional de la información", "BiD" and "Hipertext.net" editorial boards and also reviewer of several journals. Dean of the Faculty of Library and Information Science (2012-). He has also been director of the Department of Library and Information Science, vice-president of the Consortium of Academic Libraries of Catalonia (CBUC) and coordinator of "Information and Documentation in Knowledge Society" PhD program. He also collaborates with university evaluation agencies of Spain (ANEP, AGAUR, ANECA), Italy (ANVUR) and Greece (HQAA). (More information in his personal webpage: http://bd.ub.es/pub/abadal).

International Journal of Electronic Government Research, 10(4), 57-75, October-December 2014 75

APPENDIX

An appendix (see appendix.doc file) provides details of the forms used in the survey and the instructions given to fill them. The complete version of the form is available at http://citygovernance.wordpress.com/publications/.

5. Impact analysis in a new context of electronic services for the Smart City

This chapter aims to assess the impact of the Bench-learning pilot measurement (Batlle-Montserrat, Blat & Abadal, 2015) evaluating not only the effectiveness of the methodology designed, but also the updates to be carried so as to adapt the methodology to the current context of e-services in cities. Nowadays, the context and rules for public e-services have changed radically. New electronic services are appearing on a daily basis as apps for smart-phones. This new scenario is introduced in an earlier paper (Batlle-Montserrat, Merino-Zapirain & Paternain-Soler, 2008), and further developed in Batlle-Montserrat, Blat & Abadal (2015).

5.1 A new generation of electronic services for the Smart City

New electronic services are appearing everyday as apps for smart-phones. “ICING: Building the Cities of the Future” (Batlle-Montserrat, Merino-Zapirain & Paternain-Soler, 2008) introduces this emerging trend in electronic services that relies on the use of advanced mobile phones and their interaction with ambient intelligence and available data.

The paper describes the research and development performed in the ICING Project. A project co-funded by the European Commission that started in 2006 and finished in 2008. ICING was a pioneer project dealing with real implementation of ambient intelligence in an urban environment through the deployment of sensors and the development of a technological platform to support a new generation of electronic services. The technology available at that moment was limited compared with what is available today, nevertheless most of the insights of that time are becoming a reality today.

UPENET

CEPIS UPENET
UPGRADE European NETwork
The network of CEPIS member societies' publications

Mobile Technologies

ICING: Building the Cities of the Future

Joan Batlle-Montserrat, Irma Merino-Zapirain, and Carlos Paternain-Soler

This paper will be published soon, in Spanish, by ***Novática***. ***Novática***, <http://www.ati.es/novatica>, a founding member of UPENET, is a bimonthly journal published, in Spanish, by the Spanish CEPIS society ATI (*Asociación de Técnicos de Informática* – Association of Computer Professionals).

The ICING Project explore new uses of mobile technologies to increase citizens' quality of life in urban areas by means of improving their communication and interaction with the urban environment, communities, and public administration. This paper presents the project and describes the main goals, technological contributions, and benefits.

Keywords: Cities, e-Services, ICING, Innovation, Mobile Technologies, Social Networks, Strategic Planning, Web 2.0.

1 Introduction

Nowadays more than half the world's population already lives in cities and this tendency is increasing [1]. This makes it difficult to manage cities and provide a good quality of life to their citizens. Large urban areas require public administration to react efficiently while being aware of the reality of the city. If we are to make city management possible it is necessary to involve the citizens themselves in some way. Fluent lines of communication are needed between citizens and their city council. Citizens should know and be able to communicate easily with their city council. Only then will it be possible to manage cities efficiently. Meanwhile, mobile phone use in Spain has already reached a penetration higher than 100% [2], meaning there is more than one mobile phone per person. This technology offers a number of easy communications channels, some of which are already accepted by their users. However, mobile devices have many embedded technologies which either have not yet been used or did not prove to be a real solution for users. This context provides public administrations with the opportunity to use the mobile channel to offer new services, thereby improving communication with their citizens.

2 How ICING was born

During 2005, the City Councils of Barcelona, Dublin and Helsinki decided to work together on an R&D project with the purpose of finding a

Authors

Joan Batlle-Montserrat is the Head of Innovation and eGovernment International Cooperation of the Barcelona City Council. He has a Degree in Physical Sciences from the Universitat de Barcelona, a postgraduate diploma in Information Technology Audit from the Universitat Politècnica de Catalunya, and a Masters degree in Management of Information Technologies from the Universitat Ramon Llull. Mr. Batlle has been Technology Co-ordinator of Internet Services since 1997 as well as European Projects Manager. In 1991 he lead the introduction of Client/Server Platforms supporting currently mission-critical internal processes in the municipality. In 2002 he was responsible for the introduction of a Web Content Management System for the Municipality, and in that same year he was also appointed Head of the International Projects Department <jbatlle@bcn.cat>.

Irma Merino-Zapirain obtained her Master's Degree in Telecommunications Engineering from the ENSEIRB in Bordeaux in 2004 and a Degree in Electronic Engineering from the University of Mondragon in 2002. Her professional carrier has been mainly related to the European Projects domain. From 2005 to 2007 she was the Project Manager in charge of the ICING project at the International Projects Department of the Municipal Institute of Information Technology of Barcelona City Council. <icing@bcn.cat>.

Carlos Paternain-Soler is a student of the Telecommunications Engineering School of the Universitat Politècnica de Catalunya (UPC). <icing@bcn.cat>.

way to deploy citizen-oriented services through mobile phones and Web 2.0 technologies. These services aim to make it easy for urban society to merge, and to improve urban space management and council services by means of promoting citizens' active participation.

The Innovative Cities for the Next Generation project (ICING) [3] has eleven partners, a budget of 5 million euros, and a scheduled length of 30 months. The project is partially financed through the European Commission as a part of the sixth framework program of the Information Society and Technology. Project co-ordination is provided by the Dublin Institute of Technology. Also from Dublin, eSpatial is in charge of geospatial applications development. The Art and Design University of Helsinki contributes with its knowledge in the field of citizen participation and social software development. From Barcelona, 22@Barcelona and the Pompeu Fabra University are taking part through Barcelona Media, while the Barcelona Agency of Urban Ecology (BCN Ecologia) and the companies T-Systems and Telefónica I+D are also participating in the project.

ICING is exploring a new city model in which a city, by means of ambient intelligence and information provided by citizens, is able to react and adapt to the changing needs of urban society (see Figure 1).

There are a number of other projects around the world working in the same direction. Emerging information and communication technologies make it possible to redefine the way in which users relate to their immediate environment. In the case of cities, we are talking about the way citizens interact with their urban environment. Can we imagine a city in which inhabitants have access to the information everywhere, and at any time, by means of various devices; in other words, a ubiquitous city? A good example is to be found under construction at Songdo [4] (Korea). The MIT SENSEable City Lab, is working on various projects [5] aiming to create ambient intelligence and use it to study urban dynamics to improve city management. The OXIGEN Project of the Laboratory for Computer Science in the MIT [6] is also worth mentioning. Large IT companies [7] and important universities such as the University of Washington [8] or the Carnegie Mellon University [9] are also working on similar projects focusing on user interfaces, distributed services, and city ICT-enabled infrastructures to allow a richer and more efficient interaction of users with their immediate environment.

The ICING city model requires us first to address the problem of how to install new infrastructure in the city to provide lines of communication between citizens and the city (such as Wi-Fi networks or Bluetooth access points in addition to existing GSM and 3G networks). We also need to deploy a sensor network to transmit information about the city (CCTV for traffic, sound meters, pollution meters…).

Secondly, the project studies the applicability of technologies already used for the identification of logistics products (Semacodes [10], RFID labels, etc.) to identify and even "connect" urban elements.

Finally, return channels must been qualified. Citizens who use innovative services to communicate with the public administration must receive feedback; they have to know that their contribution has been considered and they should be able to see the result of their contributions and even of the contributions from other citizens. And although services may have been especially designed to be used through mobile phones, the return channel could be of a different nature going from an SMS to, say, a written letter, email or phone call.

Due to the varied nature of the services of the type described so far, for the purposes of the project the possible services were divided into three main categories:

1. Services for citizens and communities, which are services intended to facilitate contact between members of a defined community;
2. City services or e-Government services, especially designed to be used through mobile phones despite their multichannel inception and construction.
3. Services based on ambient intelligence and an ICT-enabled city infrastructure. Services enabled by deploying city sensors and through citizen involvement will help councils be more aware of the reality of their city

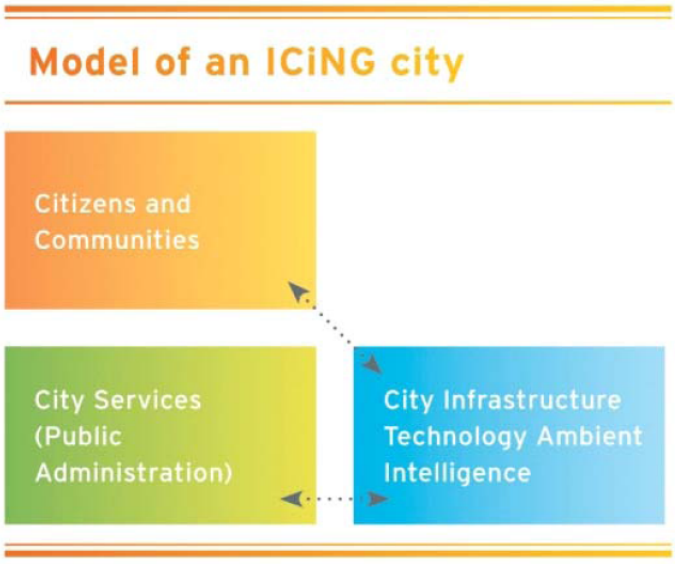


Figure 1: ICING City Model.

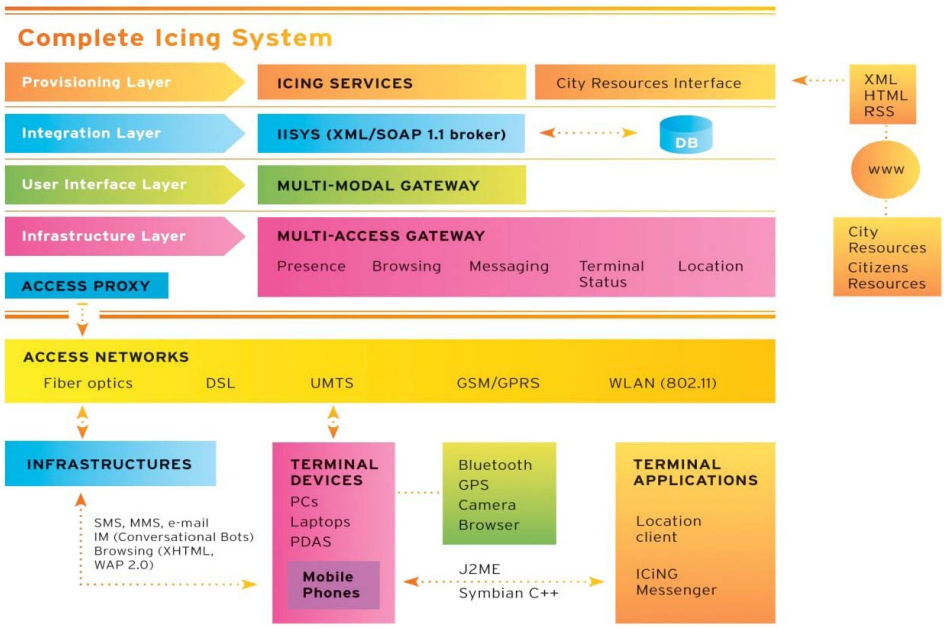


Figure 2: Architecture of the ICING'S Platform.

and allow them to respond more efficiently to its needs.

3 ICING Architecture

From a technical point of view, the Project's main aim is to develop a platform capable of integrating all the types of services mentioned above, adaptable to any city requirements and easy to maintain. The platform is based on a Service Oriented Architecture (SOA) built in multiple layers: infrastructure, user interface, integration layer, and ICING services provision layer. See Figure 2.

Firstly there is an "infrastructure layer" also called Multi-Access Gateway (MAG) which provides service access to citizens. Thanks to this gateway, citizens and digital sensors communicate with ICING services using interface based web services, which follow the Parlay X 2.0 standard defined for this purpose, independently from protocols and network functionality (hence the term Multi-Access).

This layer acts as a protocol translator to connect several networks with different technologies in just one system. In this way, MAG is a node which acts as a single entry point to the ICING platform from the several access technologies available.

As well as detecting the state and presence of terminals, messaging is one of the main functionalities provided by this layer. This functionality allows citizens to send and receive messages, (SMS or MMS messages for mobile networks and emails for Wi-Fi or DSL using SMTP protocol). Also an immediate message service has been included, which uses the XMPP protocol (Extensible Messaging and Presence Protocol) to allow any device to communicate with any other.

The location functionality is another of the most important functionalities provided by this layer. Thanks to this layer service, applications can resolve a user's location or a group's location.

The next layer is also called the "user interface" layer and is implemented as a Multi-Modal Gateway (MMG) providing multi-modal functionality to ICING services. This layer uses the MAG interface to send or receive all kinds of messages from/through the users. It is responsible for providing format to higher layers. To achieve this, it fits the information data to the active device in real-time, and to the return channel chosen by the user in its ICING profiling registry.

The method used to carry out this functionality is based on the idea of "content adaptation", which is a neutral representation of the interface produced by the service to make the final interface representation (user interface) based on device capabilities and user preferences. The kind of research which provides this technology is the "Single Virtual Terminal" paradigm (Helver, 2002), which is nowadays used to join a number of physical devices to a virtual terminal to access specific services with improved capabilities.

The MMG also manages user profiles, and so preference requests and device features are provided in this layer.

The integration layer is provided by

the ICING Integration System (IISYS). This component is responsible for integrating all the platform subsystems and is found in the architecture's core. Apart from integration, it offers data base accessibility functionalities, file management, access management, user, groups and alert management.

At the same time it allows each system to be provided in a distributed architecture. The services that have been described tend to be heterogeneous by nature and they require different functionalities apart from simple data storage to come from the sensors to allow complex communications flows and data analysis. In the aforementioned layers, some of the computing requires services and provider systems. The latter have a distributed architecture; they come from various providers and they have been implemented using deferment techniques.

In a SOA, services are treated like first class entities; therefore new services are created by combining existing services rather than by writing all the code again. Following this concept, it is very helpful to create a set of service components which are able to exist on top of each other. What is more, service users will need to find the service providers in order to execute the service. Although it is possible to make a "hard code" of the service's providers at the service's request, implementations of this method increase connections and dependencies and reduce the reuse capacity, and it is generally better to eliminate code dependencies and split up the use setting up. SOA architecture follows this principle providing a brokerage subsystem which acts as a mediator of the request between requesters and providers. The IISYS performs this mediating task and is responsible for the integration of the various subsystems. It also provides a set of computing services for normal use. The IISYS acts like an operating system; it performs tasks such as data storage and data retrieval, and makes this data accessible to the services.

Finally, the last architecture level is the "provisioning layer" where the ICING services are located. These are made up of modules and back-end applications which contain the service logic necessary to provide the three families services mentioned above.

4 ICING Pilots

To validate the architecture mentioned above and the proper operation of the existing platform, three prototypes will be implemented, one for each city involved. Helsinki is where the Urban Mediator service is being tested. The Urban Mediator is a software application which allows citizens to create and share location-based information about their neighbourhood, set up their own topics of interest, and process the available information through various on-line tools. Urban Mediator can also be used by cities as a channel to relay location-based information to citizens and ask them to report issues. Citizens can report any issue that may be of interest to the council. This is a public administration tool which, through citizen collaboration, provides information to public administration about which issues are interesting for, of concern to, or disliked by citizens. City-point comments added by citizens are displayed on a map. This information is publicly accessible by any citizen and as a result of this a forum discussion may be initiated about any issue. Helsinki will make a general test of this service for any issue suggested by citizens.

Dublin is also testing Urban Mediator, but in this case lack of accessibility is the discussion issue. Thus, anyone finding an architectural barrier in Dublin could create a discussion point linked to that geographic point and would be able to add a comment on and a picture of the reported issue.

In the Barcelona 22@ district, three different pilot schemes are being implemented. Testing is being conducted using an application developed within the project to help members of a community open lines of communications between one another. The service is based on a real-time messaging software for mobile phones, the ICING Messenger, developed by one of the project partners. This software allows fast communication between two people and it displays their proximity to one another as well as their proximity to the rest of the connected group. This powerful tool helps create social networks while facilitating communication between members of existing networks despite the fact that the pilot scheme is so far only demonstrating its functionalities and not exploring all the applications of this tool.

The second prototype is based on city traffic data reception and processing to provide citizens and city managers with real-time traffic information. This pilot project involves modifying city infrastructure. It is based on an advanced network of Bluetooth sensors deployed along the streets of a city area located in the 22@ district of Barcelona. At the same time, a second network of video cameras to monitor traffic on streets has also been deployed in a nearby area. These two networks of "sensors" are acting as a complement to the existing network of "magnetic loops" to count traffic on the streets. All the information provided by the three sensor networks is processed and adjusted to create "from-to" arrays of city mobility. These arrays indicate how pedestrians and cars are moving around the city, and they constitute an essential tool for urban planners. As a by-product, citizens obtain real-time information about traffic on the streets.

The third pilot is based on an issues-reporting service that directly involve citizens with the aim of enhancing city quality of life. The reporting service use semacodes to "tag" items of urban furniture while, at the same time, providing an easy way to report any issue related to the tagged furniture. An overflowing rubbish bin, a broken streetlight, a damaged container - anything a citizen might report could be an issue. In the actual prototype a citizen will be able to report an overflowing rubbish bin to the City Council by just one click on his or her mobile phone. This new facility will reinforce the already existing IRIS service provided by Barcelona City Council by adding a new channel to the existing service that up to now has allowed citizens to report any issue by phone (voice) or Internet.

5 A Useful Sample Case

To register a new issue it is necessary to have some information: firstly

the object related to the issue; secondly, the issue to be reported; thirdly, where the object is located; and finally, the personal details of the person reporting the issue. As well as adding a mobile channel to this kind of communication, the purpose of the project is to enable most if not all of the parameters required to set up an issue to be inputted automatically. This opens up city management to citizen participation.

City components are labelled with a Semacode (for MMS or browser communication) and an alphanumeric code (for SMS) so that every component will be related to the proper issue, as shown in Figure 3.

Not all components can be reported with the same issues: a street light may be blown, but a rubbish bin cannot be blown. We code each issue in relation to its associated element, therefore a 1 referring to a rubbish bin indicates that the rubbish bin is overflowing, while a 1 referring to street light means that it is blown. The reason for this type of coding is to use a unified "language". For example: an English speaking person will choose 1, meaning the rubbish bin is "full", and the same code would be chosen by a Catalan speaking person, meaning the bin is "plena".

The third parameter we need to know is the element's location, and this is the most difficult parameter in terms of making automatic input available to everyone. It will be much easier with the embedded GPS technology that most mobile phones will have in the near future.

Finally, it is essential to identify the person who reports an issue. Until now, whenever a citizen made use of this service he had to provide his personal and contact information. In the pilot scheme, citizens will have to register their personal information just once, when they will provide this information and their favourite incoming channel (SMS or email). The system will use this information whenever they report an issue.

Let's imagine the following situation. Imagine a citizen (we will assume a male citizen, for grammatical simplicity) who owns a GPS mobile phone with the bi-dimensional code or Semacode reader application installed

Figure 3: Rubbish Bin Tag.

and who has already registered with the council. This citizen comes across an overflowing rubbish bin and he wants to report it to the council, so the rubbish can be emptied. The citizen will open the application in order to read the rubbish bin code. Automatically the reader will recognize the Semacode and send a request to the City Council IRIS [11] service, including the user's ID, the ID of the offending element, its location, and the issue. With this simple action, the issue has been reported to the city cleaning company and a tracking code has been sent to the citizen through his preferred return channel. The issue reported is attended by the cleaning brigade according to the established SLA and the citizen is notified when the problem is solved. All this happens with just one "click", as if by magic!

6 Conclusions

This ICING project explores the opportunities provided by the new mobile technologies and Web 2.0 technologies implementation for improving urban quality of life. This project offers the community a platform which allows cities to deploy advanced services to encourage social integration making use of social networks and citizen participation in the management of the city. Services which provide new information about the state of the city, allowing public managers to act faster and better while providing the citizen with qualitatively and quantitatively better information. The cities of Barcelona, Dublin and Helsinki will be the first to implement the pilot services provided by this platform.

Translation by the authors

References

[1] United Nations Population Fund. <http://www.unfpa.org>.

[2] "La penetración del móvil en España es del 107% (107 % penetration of mobile phones in Spain)". La Vanguardia, October 16th, 2007. <http://www.lavanguardia.es/lv24h/20071016/53402620684. html>.

[3] ICING Project. <http://fp6-project-ICING.eu>.

[4] Songdo u-City. <http://www.songdo.com/default.aspx>.

[5] WikiRome Project. <http://senseable.mit.edu/wikicity/rome/>.

[6] OXIGEN Project (MIT). <http://oxygen.lcs.mit.edu/publications/Oxygen.pdf>.

[7] CoolTown Project, Hewlett Packard. <http://www.hpl.hp.com/techreports/2000/HPL-2000-110.pdf>.

[8] Portolano Project at University of Washington. <http://portolano.cs.washington.edu/papers/mobicom99/mobicom.pdf>.

[9] Aura Project. Carnegie Mellon University <http://www.cs.cmu.edu/~aura>

[10] Semacode. <http://semacode.com>.

[11] IRIS Project. <http://www.bcn.es/ajuntamentescolta/english/welcome.htm>.

5.2 Impact analysis and methodology improvements

The paper entitled “Towards benchmarking Smart City Services: Impact analysis and methodology improvements of the Local e-Government Bench-learning” Batlle-Montserrat, Blat & Abadal, (2015) analyses the impact of the Bench-learning pilot measurement and the methodology update to adapt it to the current context of e-services in smart cities.

After a revision of the existing impact analysis of e-government benchmarking, it analyses the actual impact of the Bench-learning pilot measurement with respect to improvements in services. The research is based on a survey carried out in the same 15 cities four years after the pilot study and the analysis of its results.

The paper presents evidence that Bench-learning methodology helped cities to identify good practices that they could learn from, and that some e-services were subsequently improved. Nevertheless, the survey reveals that some changes are needed in the methodology. The main one being the updating of the bottom-up e-services catalogue, which is linked with the changing context of e-services in smart cities, already introduced in the previous paper. A second one is the measurement of the adoption of e-services by citizens, also rarely assessed.

Finally, the paper analyses and discuss how the context of e-services in cities has changed. The phenomenon of smart cities is changing the ecosystem of e-services with the inclusion of new actors (e.g. citizens, third sector, entrepreneurs, companies). The deployment of ambient intelligence and the availability of important amounts of data related to city environment and citizens' activities brings new possibilities for new actors to develop innovative services that compete with the traditional e-services provided by local e-government agencies.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 1

Information Polity -1 (2015) 1–18 1
DOI 10.3233/IP-150366
IOS Press

Towards benchmarking smart city services: Impact analysis and methodology improvements for local e-government benchlearning

Joan Batlle-Montserrat[a,*], Josep Blat[b] and Ernest Abadal[c]
[a]*Municipal Institute of Informatics, Barcelona City Council, Barcelona, Spain*
[b]*DTIC, Pompeu Fabra University, Barcelona, Spain*
[c]*Faculty of Library and Information Science, University of Barcelona, Barcelona, Spain*

Abstract. We claim that local e-services benchmarking studies summarized in indexes do little to enhance city managers' and academics' understanding of actual e-government performance, or to improve the e-services offered by cities. We undertook a different benchmarking approach, focused on learning best practices among cities, in late 2008 and early 2009. A benchlearning methodology (BLM) was developed, and a pilot study with 15 European cities was carried out. In this paper, we present the actual impact of the benchmarking study with respect to improvements in services, as the effectiveness of e-government benchmarking has rarely been evaluated. We discuss and analyse the results of a survey carried out in the same 15 cities four years after the pilot study. This paper presents evidence that BLM helped cities to identify good practices that they could learn from, and that some e-services were subsequently improved. The survey reveals that some changes are needed in the benchmarking methodology. The main one is the updating of the BLM bottom-up e-services catalogue, which is deeply discussed within the changing context of Smart Cities, especially the enlargement of the ecosystem of e-services to include citizens, the third sector, entrepreneurs, companies and other actors. A second one is the measurement of the adoption of e-services by citizens, also rarely assessed.

Keywords: e-government, public administration, e-services, adoption, benchmarking, smart city services

1. Introduction

Both practitioners and academics are interested in benchmarking e-government services, because e-services and websites are the most visible parts of e-government and have the greatest impact [33]. Some well-accepted e-government stage models [7,9] facilitate the performance of e-services maturity assessments [23,28,33,42,44], which are a widespread benchmarking strategy. However, a literature review shows that e-government benchmarking mostly addresses national level, and its granularity is not useful for cities [5].

*Corresponding author: Joan Batlle-Montserrat, Clot 100, 1r 1a. E-08018 Barcelona, Spain. Tel.: +34 670098407; E-mail: joan.batlle.montserrat@gmail.com.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 2

Cities are gaining importance in the global economy and play a key role in service provision, but benchmarking studies of cities' e-government are scarce. Some reasons for the lack of local benchmarking methodologies and rigorous cities surveys are the diverse socioeconomic environments and contexts in cities, which make it difficult to compare performance [16]. This is compounded by the rich variety of e-services on offer, which is greater than in any other public administration [59]. In 2008–2009, a bottom-up local e-government benchlearning method was developed to address both the variety of services and citizens' adoption of e-services, which is rarely studied compared to the more widespread assessment of provision. Named Bench-learning Methodology (BLM), it was designed to help managers understand the e-services their cities provide, through comparison with other cities, and to help identify best practices related to e-services [6]. BLM was implemented in a pilot benchmarking study involving 15 diverse European cities [4].

To date, there has been little research on the actual impact of e-government benchmarking practices. Janssen [33] and Bannister [3] suggest that this is because most benchmarking studies are occasional exercises to compare similar organizations, and are not part of a long-term strategy to enable high performance in e-government, as Heeks [28] and Salem [58] state they should be. In this paper, we present the results of a survey we carried out in the 15 cities that took part in the pilot BLM benchmarking study, to analyse the impact of this new type of benchmarking on cities e-services provision and related policies. We show that BLM was, in general, quite fruitful, as it led to an improvement in e-services.

Furthermore, we used the survey responses to analyse the positive and negative aspects of the benchmarking approach, in terms of e-government improvements. Key aspects that require further refinement are the measurement of citizens' adoption of e-services, which has received insufficient research attention, and the catalogue of e-services. The need for the latter is to have been expected, given the dramatically changing context of smart cities. Indeed, in recent years, the local landscape has changed significantly. Besides increased citizens' participation 2.0 that is considered in the BLM, the move towards more intelligent cities has led to services being offered/shared by citizens themselves, as well as new public-private partnerships to shape smart cities worldwide. Both trends mean new opportunities for improved e-government, but add layers of complexity to the assessment of e-government, whose strategies and methodologies need to be reframed. Here we examine this reframing in depth, based partly on an analysis of the impact of BLM benchmarking, and partly on a discussion of the new trends.

After a review of related work on benchmarking e-government, especially local e-services, we discuss how we analysed the actual impact of BLM benchmarking, and describe the survey techniques. We then analyse the BLM results, and show how this new type of benchmarking helped cities to improve their services. We then turn to the more methodological issues of assessment/benchmarking in the context of smart cities development. We further discuss the measurement of adoption by citizens beyond mere service provision, and the e-services panorama in which there is a plethora of new stakeholders. We conclude by suggesting key research perspectives.

2. Related work

Benchmarking means evaluation through comparison. In this paper we are concerned with benchmarking local e-government in a way that is useful for city managers and researchers alike. An in-depth review of the most important e-government benchmarking studies shows that very little attention has been paid to local public administration. Not a lot has changed since this was noted by [42]. However, quite a few comparisons have been performed at state level, particularly [11,36,48,49,64,65]. Recently [63] introduced multicriteria decision support incorporating better stakeholders' own viewpoints and preferences.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 3

The few studies that address local e-government do not deal with the complexity resulting from the richness of local e-services [31], which is a key element of local e-government and a focus of our study. Some relevant exceptions are Kaylor [37], Shackleton et al. [60], Flak et al. [20] and Löfstedt [46].

It might be argued that the diversity of cities could hinder any useful comparisons [16], but research shows that cities around the world actually share a lot of services. A field study [53] on how seven major European cities provide an advanced level of transactional e-services revealed a panel of seventeen common services. More recently, [22] showed strong evidence of commonalities in city e-government services at a much wider international scale. Thus, there should be room for cities e-government benchmarking, based on a set of similar services that are delivered, rather than a comparison of similar organizations [32]. Consequently, local e-government transnational benchmarking looks feasible.

Although we can only fully appreciate the actual impact of e-services on citizens by addressing provision and adoption [49], most e-government benchmarking studies focus only on the delivery of e-services by administrations, and pay no attention to their real use by citizens. Scholars and international organizations have repeatedly requested studies of this kind [15,28,33,34,41,51]. However, little progress has been achieved to date. The most recent benchmarking studies, carried out by CapGemini et al. [10], the OECD [50] and the United Nations [62,65,66], indicated that service adoption is key to assess e-government performance, but did not measure this factor.

Most city benchmarking studies result in rankings according to indexes. Moonen and Clark [47] identified up to 150 city indexes, benchmarking studies and comparative rankings, based on macroeconomic indicators or subjective surveys, with samples ranging between 6 and 2,000 cities. Recently, similar rankings of cities according to their smartness, intelligence or sustainability have appeared. The most rigorous approaches come from academia or economic research institutes. They are based on aggregate indexes, resulting from weighted multiple indicators. An example is the European Smart Cities Index [25], which was designed by 3 universities.[1] It considers 6 characteristics by which cities could be "smart": economy, mobility, environment, people, living and governance, leading to 74 indicators to be measured. This index was first used on around 70 European mid-sized cities in 2007. Other rankings are less rigorous, as they do not provide information about the selection of the sample, they use a small number of indicators, or they lack transparency in the data gathering method and index calculation, as already discussed by [24].

Rankings based on aggregated indexes have often been criticized by academia due to the difficulty of designing a well-grounded method for them [3]. More recently, Rorissa et al. [56] highlighted that the computation of current e-government indexes has significant limitations, as it does not differentiate e-government development levels or national dimensions and their development. These limitations are even greater for smart cities indexes, as there is no widely accepted definition of a smart city [18]. Giffinger and Gudrun [24] stated that rankings are quantitative approaches that concentrate on the aspects that are measurable, instead of the important issues. A further limitation results from the adaptation of indexes to what is available in databases (e.g. the Global Power City Index). According to [63], rankings should be based on transparent computational procedures to maximize their acceptability by both governments and the scientific community, leading to frameworks and indexes that achieve wide consensus. However, Kourtit et al. [39] claim that no list of indicators will ever be complete or fit-for-purpose. In the end, rankings are tools for city marketing, rather than being useful for improving e-government.

[1] The Centre of Regional Science (Vienna University of Technology), the Department of Geography (University of Ljubljana) and the Research Institute for Housing, Urban and Mobility Studies (Delft University of Technology).

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 4

Batlle et al. [4] introduced BLM to address the lack of useful benchmarking methods for local e-government. Here, we discuss the main (novel) characteristics of BLM, to ground the design of the survey questions and the survey analysis.

The new method takes into account the multiplicity and variety of e-services in cities, and proposes a bottom-up approach (as suggested later by the UN [64]) to build a hierarchical catalogue of services, also aligned with the much more recent [32]. Through participatory data collection on the services provided in each city, up to 81 common and less common services were identified. These services were classified into nine thematic categories (Channelling, Citizens' Engagement, Education, Employment and Business, Environment, Life-cycle, Social Care, Transport and Urban Planning). The citizens' engagement category includes the online services that open up channels to citizens for online participation in public affairs [65].

To measure the maturity of e-services, the well-known Gartner Model [7] was adopted for the BLM, and extended with a fifth level of maturity to cope with richer citizens' interaction and involvement in e-services provision through web 2.0. BLM focuses on citizens' interaction, and its model is quite similar to Lee's [44], which is the revisited version of Kayne and Lee [43], and can be considered a simplified version of the Manchester e-Government Maturity Model [29] in which citizen-led service provision is at higher maturity stages.

BLM assesses both the provision and adoption of e-services. While most research focuses on understanding the drivers of citizens' use of e-government and users' satisfaction [38], BLM addressed the lack of comprehensive data on actual e-government usage, and introduces a simplified measurement framework. Expected versus actual adoption is estimated on the basis of self-assessment surveys after training (which is a widely used technique that is accepted in e-government measurements, as argued in [6]).

Finally, instead of presenting a ranking of cities based on an aggregated index, BLM uses a novel city chart display approach, to try to offer decision-makers materials that are better suited to informing decisions on e-government strategies. As a result of the data analysis and reporting, a display of each city's profile is generated according to the provision and adoption of the thematic categories of services (with respect to average values), and the objectively measured best practices in different categories.

The methodology and the results of the first pilot benchmarking study involving 15 diverse European cities are discussed in depth in [6].

A further step towards the validation of a methodology, or even a repeated benchmarking exercise, is the analysis of its real impact on cities e-government. However, this aspect has received very little attention in the e-government benchmarking literature. Janssen's [33] critique of two of the most important national-level benchmarking studies, CapGemini Ernst & Young and Accenture e-Government Benchmarking, provides insights into how to increase quality and usefulness, for example by including the demand side or take-up as a criterion, taking into account the multichannel approach, adopting a citizen-centric rather than an organization-centric logic, adapting the maturity framework to include proactive services, and including services at regional and local level. BLM addresses most of these issues. Heeks [28] examines the real use of e-government benchmarking data, and concludes that there is a lack of evidence of the use and actual impact of such comparisons. Bannister [3] discusses the difficulties of carrying out rigorous and useful e-government comparative evaluations, and [3] and [33] highlight the unhealthy effects of repeating some benchmarking studies, such as [9], because organizations will often adapt their behaviour to what is being measured and design policy around scoring better instead of around citizens' needs. Indeed, Schellong [59] analysed CapGemini Ernst & Young, United Nations and Brown University benchmarking studies and concluded that they may lead policy makers to allocate

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 5

resources to improve country rank, rather than investing in infrastructure, e-participation or other areas that are important to citizens.

According to [56,63], the impact of e-government benchmarking falls into three categories: (1) measuring retrospective achievement, which helps policy makers to compare how their country or agency ranks in terms of e-government; (2) charting prospective direction/priorities that policy makers can use to make strategic decisions and identify appropriate courses of action; and (3) holding government decision makers accountable for investments in e-government.

The survey analysed in this paper tries to decide whether BLM as a benchmarking study actually helped city managers to improve e-services, basically aligned with category (2). As indicated earlier, the survey took place four years after the benchmarking study, and was administered in the same cities that took part in the BLM. The aim of the survey was also to determine the effectiveness of the new features of the BLM, and to put these features in the framework of the changing landscape of local e-government in the progress towards smart cities.

Thus, the results discussed below provide empirical evidence that helps us to understand the advantages and limitations of the methodology, and to design more useful local e-government benchmarking studies.

3. Techniques of the BLM impact survey

The aim of the BLM and the pilot study was to design a benchmarking method that could help to improve city e-services. Consequently, it was logical to then assess whether the actual pilot benchmarking study had led to any improvements, and whether the methodology itself needed to be revamped. We undertook this evaluation and analysis in 2013–2014, through a survey of the 15 cities[2] that had taken part in the original BLM. Ten of the cities responded, i.e. approximately 2/3. In addition, a city responded to the survey that had not participated in the pilot study, but had benefited from the final benchmarking report.

An online survey was administered to the 15 cities that took part in the benchmarking. It was also sent to four other cities that had initially been interested in participating in the 2008 benchmarking but did not take part for various reasons. High staff mobility in city administrations meant that the relevant people could have changed jobs in the period between the pilot study and the survey. We identified those in charge when the survey was administered, and sent them a link to the survey, along with an explanatory e-mail.

In the survey, the first question identified the respondent and was followed by a block of 3 questions on the impact of the benchmarking study on e-services improvement. The next block was about the new context of cities, and suggestions for improvements. Two final questions were about participation in a new benchmarking study. Most of the ten questions had several parts, and respondents were guided through multiple choice options, giving a total of 54 'simple' questions. Free text input was allowed only for clarifications or suggestions. The aim of simple questions is to obtain a lot of detail, to compensate for the subjective nature of the survey as much as possible. This seems to have worked in view of the results of consistency checks (on answers and raters).

[2] A group of European cities led by Barcelona within the Knowledge Society Forum of the Eurocities Network (www.eurocities.eu).

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 6

Table 1
Survey consistency check

Questions	Scale	Items	Test	Index
Q1, Q2, Q3, Q5, Q6, Q7, Q10	Dichotomous	31	KR-20	0.56748
Q4	Likert 5	9	Cronbach's Alpha	0.87865
Q8	Likert 3	9	Cronbach's Alpha	0.90195
Q9	Likert 3	4	Cronbach's Alpha	0.65063

Table 2
What cities learnt from BLM benchmarking results

Answer	Yes	No	I don't know
The position of your city against competitors	78.57%	21.43%	0.00%
Cities with a similar profile to share experiences	92.86%	7.14%	0.00%
The extent of the catalogue of services that cities offer	71.43%	28.57%	0.00%
New services that can be offered to citizens	71.43%	28.57%	0.00%
New functionalities or richer interaction levels	64.29%	28.57%	7.14%
Categories in which the city is under-performing	64.29%	21.43%	14.29%
The importance of measuring the adoption of e-services	85.71%	14.29%	0.00%
Good practices to learn from	92.86%	0.00%	7.14%

The statistics (Table 1) show considerable internal consistency of the answers. The Kuder-Richardson Formula 20 test was passed by all dichotomous questions, with a KR20 reliability index of 0.56. Questions based on Likert scales were analysed according to Cronbach's Alpha reliability test. Q4 and Q8 had a high Alpha value of over 0.85; the Alpha value for Q9 was 0.65, which is moderate, but valid.

4. Results

From the 15 + 4 cities contacted, 10 of those which had participated in the benchmarking and 1 which had been interested but finally did not replied, i.e. approximately 2/3 of answers.

4.1. Learning from the benchmarking pilot study

The answers to question (Q2) about each e-service category, *What did you or your organization learn from the results of the Local e-Government Bench-learning survey? (Answer per category: Yes / No / I don't know)* are summarized in Table 2.

All respondents who participated in the benchmarking study agreed that it had been useful to identify similar cities and good practices to learn from. Most benchmarking reports end with a summary index, which hides the actual good practices; BLM intends to shed light on them, and the answers seem to confirm that this stress on the learning dimension was successful. More specifically, 78% of respondents declared that the survey had helped them to understand the position of their cities compared to other similar cites. A total of 71.43% respondents declared that they had learned the extent of the catalogue of services that cities were offering, and new services that could be offered to citizens; 64.29% learned new functionalities or richer interaction levels and categories in which their city was under-performing.

In another aspect, 85.71% declared that they understood the importance of measuring citizen's e-services adoption. This is a positive perception of e-services comparisons that require an analysis of both the provision and adoption of services to see the whole picture.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 7

Table 3
Aspects in which cities have benefited from BLM benchmarking

Answer	Yes	No	I don't know
Understanding the global position of your city	92.86%	7.14%	0.00%
Visualizing the maturity and coherence of the e-service offer	64.29%	14.29%	21.43%
Identifying strengths and weaknesses in the e-service	64.29%	28.57%	7.14%
Better planning of the next improvements in the e-service offer	64.29%	21.43%	14.29%

Table 4
How useful the good practice list is for cities to learn from

Answer	Very useful	Quite useful	Useful	Slightly useful	Not useful at all
Channelling	14.29%	28.57%	14.29%	42.86%	0.00%
Citizens' engagement	21.43%	35.71%	28.57%	14.29%	0.00%
Education	7.14%	35.71%	21.43%	35.71%	0.00%
Employment & business	0.00%	42.86%	14.29%	42.86%	0.00%
Environment	21.43%	35.71%	14.29%	28.57%	0.00%
Life cycle	7.14%	35.71%	35.71%	21.43%	0.00%
Social care	14.29%	28.57%	35.71%	14.29%	7.14%
Transport and mobility	14.29%	64.29%	7.14%	14.29%	0.00%
Urban planning	7.14%	35.71%	35.71%	14.29%	7.14%

4.2. Usefulness of display tools and impact on e-services

BLM display and reporting are aimed at understanding parameters related to the services, by presenting each city's results compared to the average.

The answers to question (Q3) *Please indicate which aspects of your city e-government have benefited from the city maps offered by the Local e-Government Bench-learning report (Answers per category: Yes / No / I don't know)* are summarized in Table 3.

The BLM display and reporting proved useful, since 92.86% of respondents declared that city maps helped them to understand the position of their city. Some improvements are needed, as only 64.29% found city maps useful to understand the maturity and coherence of the city's e-service offer. The city map was useful to identify strengths and weaknesses in e-services or to better plan improvements for 64.29% of respondents in both cases.

One free-text comment hints at a shortcoming that has been "patched" by the ICT supplier: *"The report was shared with individuals and has inspired insights, but has not been used strategically for improvements because there is no e-government department – only an outsourced ICT supplier that deals with individual departments"*. This is an extreme case in which there is no department or position to deal with e-government strategic decisions. It shows the divide between e-government practitioners and ICT suppliers. In such a situation, the benchlearning seemed to help to realize the importance of defining such a position.

4.3. Impact on specific e-services

The answers to question (Q4) *Please indicate in which areas or service categories the good practice list resulting from the Local e-Government Bench-learning has been useful for your city to identify initiatives to learn from (Answers: Very useful / Quite useful / Useful / Slightly useful / Not useful at all)* are summarized in Table 4.

When we asked how useful the good practices list for each category had been to identify initiatives to learn from (Q4), the answers revealed quite a positive outcome. In each category, at least 57.14%

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 8

Table 5
Areas in which cities have started or planned actions to improve e-services

Answer	Yes	No	I don't know
Channelling	50.00%	28.57%	21.43%
Citizens' engagement	71.43%	14.29%	14.29%
Education	35.71%	28.57%	35.71%
Employment & business	35.71%	28.57%	35.71%
Environment	57.14%	21.43%	21.43%
Life cycle	28.57%	42.86%	28.57%
Social care	50.00%	28.57%	21.43%
Transport and mobility	42.86%	28.57%	28.57%
Urban planning	28.57%	28.57%	42.86%

of respondents found the good practices list either very useful, quite useful or useful, with Citizens' Engagement and Transport and Mobility in first place with 85.71%, while Channelling and Employment and Business both received 57.14%.

The number of services included in the list of good practices might vary in different categories. Therefore, we analysed the correlation between the number of good practices per category and the perceived overall usefulness (measured as 1*very_useful + 0.75*quite_useful + 0.5*useful + 0.25*slightly_useful + 0*not_useful). The correlation was low and negative (correlation index = −0.399), so we discarded it. This result reinforces the reliability of the survey, as the answers seem to be reflective rather than obvious from the information presented to the respondents.

The salient practices list resulted from their position (= rho*100 + adoption level, where rho is distance to average maturity). A correlation analysis of position and perceived usefulness per category resulted in a low positive coefficient of 0.341, which increased to 0.735 when the two extreme values were discarded. Therefore, there seems to be a slight direct relation between the perceived usefulness of the good practices list and the objective measure of saliency. This weakness reinforces the idea that summary indexes are not highly relevant for services improvement.

The answers to question (Q5) *Please indicate in which areas or service categories your city has started, or plans to start, any action to improve the e-services offer as a consequence of the Local e-Government Bench-learning results (Answers: Yes / No / I don't know)* are summarized in Table 5.

Q5 results show the cities in each category that had started, or planned to start, actions to improve their e-services offer as a result of the benchmarking study. Citizens' Engagement was the most popular area (71.43%), followed by Environment (57.14%), while in Life Cycle and Urban Planning the percentage was only 28.57%. There was a weak positive correlation (0.511) between this percentage and the usefulness of the good practices list.

4.4. Measuring techniques (self-evaluation)

Table 6 summarizes the answers to question (Q6) *Is self-evaluation a good method to assess the service provision, maturity of e-services and citizens' adoption? (Answers: Yes / No). If the answer is (No), please suggest how to improve the evaluation method.*

The results indicate that self-evaluation of service provision, as practised in the BLM pilot study, was considered a good assessment method (85.71%), and that the expanded maturity framework was adequate (71.43%). Nevertheless, the method for measuring citizens' adoption was only accepted by 57.14% of participants, while 46.86% thought that this aspect was not well assessed.

A suggestion for improvement was: *"Need national benchmarks to judge if adoption rate is significant. It would be good to compare it against an excellent example of fully fledged service provision*

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 9

Table 6
Applicability of self-evaluation

Answer	Yes	No
Service provision	85.71%	14.29%
Maturity	71.43%	28.57%
Adoption	57.14%	42.86%

Table 7
Current use of metrics to measure citizens' use of e-services

Answer	Yes	No	I don't know
Number of web pages viewed	85.71%	14.29%	0.00%
Number of web visits or sessions	100.00%	0.00%	0.00%
Number of forms downloaded	78.57%	14.29%	7.14%
Number of forms submitted	85.71%	7.14%	7.14%
Number of transactions	85.71%	0.00%	14.29%

Table 8
Aspects that BLM needs to improve

Answer	It's OK	Needs some adjustments	Needs to be re-designed
Catalogue of services	28.57%	35.71%	35.71%
Service categories	28.57%	42.86%	28.57%
Matrix of service coverage	21.43%	57.14%	21.43%
Evaluation method	28.57%	50.00%	21.43%
e-Government maturity model	50.00%	42.86%	7.14%
Scale of adoption	42.86%	50.00%	7.14%
Global maps	50.00%	50.00%	0.00%
City maps	57.14%	42.86%	0.00%
List of good practices	35.71%	57.14%	7.14%

from inside the municipality; however, I believe we should ask citizens or service users, to get a balanced picture". This suggestion reveals the lack of standards and references to measure adoption; and the proposal is to provide examples of different adoption levels to support self-evaluation. The national dimension seems more relevant for a detailed benchmarking study within a country: references might be drawn from different countries, as there seems to be commonality of services, despite wide differences among cities. The final remark is of key importance: as adoption refers to uptake by users, experts' adoption measurements should be complemented by objective measures and/or the users' views.

The benchmarking study took place in 2008–2009 when it was not common to measure the use of e-services, which is the first step towards measuring adoption. Indeed, in 2009, the OECD [49] found that only 14 out of 22 OECD countries were measuring uptake. However, this situation has changed enormously, according to Q7.

Table 7 summarizes the answers to question (Q7) *Which metrics does your organization use to measure citizens' use of e-services? (Answers: Yes / No / I don't know).*

Cities have progressed considerably in the objective measurement of citizens' use of e-services. Data such as the number of web pages viewed (85.71%) and the number of web visits or sessions (100.00%) are now widely used, and have been consolidated as basic indicators of e-services use. More importantly, the number of forms submitted (85.71%) and the number of transactions (85.71%) have been widely adopted and are better adoption indicators that open the way to establishing a new adoption measurement framework.

4.5. Overall benchlearning method

Table 8 summarizes the answers to question (Q8) *Please indicate which areas of the Local e-Government Bench-learning methodology need to be improved (Answers: It's OK / Needs some adjustments / Needs to be redesigned).*

More than 70% of respondents thought that the catalogue of services, the service categories, and the matrix of service coverage needed to be adjusted or even redesigned (in the case of the service catalogue)

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 10

Table 9
How often cities participate in e-government benchmarking

Answer	Never	Sometimes	Once a year	I don't know
Regional level	7.14%	85.71%	7.14%	0.00%
State level	7.14%	78.57%	14.29%	0.00%
European level	0.00%	92.86%	7.14%	0.00%
Worldwide	35.71%	35.71%	21.43%	7.14%

to be more useful. One comment *"... 'needs some adjustment' assuming that e-services have moved on considerably since we did the first study and more one-stop shop services are now on offer, adoption of mobile devices is changing how citizens interact with us, etc."* highlights the changes in e-services discussed at the beginning of the paper. Specifically, it indicates that there have been organizational changes in service provision (the introduction of one-stop shops) and that new channels have been introduced for citizens to interact with government (a high rate of mobile devices).

The evaluation method needs some adjustments according to 50% of respondents. The e-government maturity model was considered "OK" by 50%, while the framework for measuring adoption must be redesigned, according to 57.14% of respondents, which is in line with the results indicated above. The list of good practices needs some adjustments (57.14%), which is again in line with the changes in e-services. Global maps and city maps were considered to be suitable by 50% or more of the respondents.

4.6. Benchmarking frequency and specific interest in benchlearning

Table 9 summarizes the answers to question (Q9): *How often does your city participate in e-government benchmarking surveys? (Answers: Never / Sometimes / Once a year / I don't know).*

The answers to this question reveal that cities do participate in e-government benchmarking at regional and state levels, at the European level (the most common) or worldwide (the least common), but that the frequency is less than once a year.

One comment in the free-text area stated *"The council does compete nationally for 'beacon' status and other awards. These can include e-government services, but they are specific to a service area. To my knowledge, there is no national cross cutting e-government comparison that looks at the variety of services that the benchlearning study did."* This shows that the variety of services that the BLM takes into account is one of its strengths, and adds real value compared with other initiatives.

The answers to question (Q10) *Would your city be interested in participating in a new edition of the Local e-Government Bench-learning survey at European level?* show that the vast majority of respondents (78.57%) would participate again. One city would not, and two did not know. This interest in participation seems to confirm the positive perception of BLM.

5. Discussion

Below we discuss the results in greater depth, within a stronger research context.

5.1. Does BLM support learning by cities?

We hypothesized that benchmarking studies summarized in indexes with an associated city ranking are probably not very useful, while BLM that provide greater detail, including a comparison of e-services within a city itself, a comparison with other cities through specific averages of e-services or e-services categories, and the identification of advanced and highly adopted services, would be more useful.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 11

The wide range of Q2 responses in Table 2 seems to support the success of this approach. Respondents identified a range of areas in which they had better understood both their e-services offering and what could be improved, using examples from other cities. A ranking does not help a city manager who wants to improve e-services, but BLM reveals what a city's e-service offering is like, what its strengths are, where it fails, how heterogeneous it is, etc. To learn from others, it is important to identify similar cities in terms of the offering of e-services rather than dimension, population or organization [32], and identify the services that are successful in those cities. BLM represents a step forward in these aspects, as the visual tools that support this understanding through a non-competitive presentation (Q3) received a positive evaluation.

Q4 inquired quite precisely about the usefulness of the best practices list, which comprises the most advanced and commonly adopted practices. The answers were diverse: the good practices in the list were found to be useful across all categories, but to different degrees. The correlation between the usefulness of the list and the number of cases included in it was low (which shows the high reliability of the answers), as was the correlation with the higher ranked practices (which indicates that rich information is necessary to be useful).

Therefore, BLM achieved its purpose of helping cities to learn from one another on specific points, and to improve the organization [1]. Detailed pictures of the services enabled city managers to locate performance gaps, and to prioritize opportunities and areas for enhancement [59].

Nevertheless, the BLM pilot study and the result of this survey cannot claim to be representative. One aspect is that cities involved in the BLM pilot are medium-to-large, and small cities and villages were not benchmarked. The authors intended to complement the pilot with an extensive benchmarking covering small cities and villages in a specific region (Catalonia), and with a larger one at the European level. This would have increased statistical significance, and allowed a more refined segmented analysis according to different city characteristics. The difficulties faced by European public administrations in the period after the pilot are the main causes that this gap has not been filled yet.

5.2. Does understanding translate into actual e-services improvement?

One of the aims of BLM is for better understanding to be translated into e-services improvement. Q5 showed a weak positive correlation between the best practices list and the categories of e-services that were reported as improved. Thus, the best practices identified through BLM led to e-services improvements. The weakness of the correlation was to be expected, as cities are diverse, and have different priorities. This means that benchmarking studies should provide rich pictures, to support diverse learning and strategic planning.

5.3. Methodological aspects

Aspects of BLM were rated differently. First, it was considered that the bottom-up catalogue of services should be redesigned, due to the manifold changes in e-services since the pilot study. A specific subsection discusses this in depth in the smart cities context. The role of the bottom-up catalogue is described below. Rather than using an existing taxonomy, categories were defined in order to group existing services into thematic areas that were identified as key for city e-government. The resulting categories were instrumental to provide aggregated information for strategic planning in a legible way. This contingent catalogue now needs to be revised and adapted, to take into account new trends in e-services and public policies.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 12

Although the e-government maturity model for assessing the services offering was well-rated, it should be updated to better cope with the new types of e-services on offer. According to [29], e-government develops over time, and further developments emerge that need to be incorporated into any revised maturity model. A high number of e-government maturity models exist [19]. However, the model that is selected should address the richness and variety of e-services, and be easy to apply in the self-evaluation process used for measurement. The Manchester e-Government Maturity Model [29] once split in its two dimensions, front-office and the back-office, seems a good recent alternative that will add a new dimension to the e-services maturity analysis.

The rich display and reporting, and the good practices list, were also well-rated and need fewer significant adjustments.

The self-evaluation technique is key to affordable benchmarking studies, and has been used in other e-government research [32,35,58]. The survey answers indicated that it provides fair accounts, but less so when measuring service adoption. This aspect is discussed in more detail in the subsection below.

5.4. Measuring adoption and introducing citizens' views

The self-evaluation technique used to assess provision relies on a widespread, accepted (maturity) framework to significantly reduce subjectivity. An accepted framework is essential to assess adoption based on self-evaluation [64]. Such a framework is lacking, but we still need to measure citizens' use of services to understand where e-government stands. Therefore, as a first step to reducing the existing design-actually gap [27], BLM adopted a simplified approach that could be self-assessed: expected versus actual adoption.

The e-services adoption concept is more specific than use: it is the rate of service provided through e-means vs traditional channels. In 2004 [34], the following factors were identified as key: the number of individuals and businesses that used e-services, the percentage of citizens that visited websites to search for information, the number of businesses that made payments online, and the percentage of internet traffic related to e-service delivery. Two years later [14], different web metrics were proposed: the number of hits or user contact sessions, the number of document downloads, the amount of time users spend on a site, the number of transactions completed, and web analytics (click streams, repeat use and cross-usage). Some of these indicators are not supported by current web metrics. More importantly, they seem more aligned with *absolute* service use than with *relative* adoption, which should be in terms of rates, rather than absolute numbers. Nevertheless, measuring use of e-services is a first step towards assessing adoption.

When the BLM benchmarking study was carried out (2008–2009), no metrics on use were shared by the participating cities. McKinsey remarked in 2009 that governments had few web analytics experts,[3] and in 2012 the U.S. government launched the Digital Analytics Program to help agencies meet the requirement[4] of implementing web analytics in 3 months. European governments seem to be following this pattern, as most survey respondents reported that they use web metrics. Now, Table 7 reveals that some standard quantitative metrics related to adoption have been widely introduced by the cities surveyed.

However, many barriers still hinder the assessment of adoption. A first one is that services with different levels of sophistication need different adoption measurements [61]. Higher maturity means different

[3] http://www.mckinsey.com/insights/public_sector/e-government_20.
[4] http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government-strategy.pdf.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 13

modalities and user interaction: while the use of an information service (level 1) can be measured through the number of web pages served, a transactional service (level 3) needs to count the number of completed transactions. Further research is needed to identify the right adoption indicators to be used at each stage of maturity. Smart e-services, discussed in the following subsection, will require similar indicators. For instance, the actual use of apps – not just the number of downloads – needs to be measured in the context of a tool-shift or process-shift in the way citizens do things.

A second barrier is that targets are not the same for each service. Different services involve different populations with different social characteristics and frequency of use. Therefore, rates are difficult to compute.

Although research has led to a greater understanding of the drivers of citizens' use of e-government [38], there is still a lack of data on real use [66].

The measurement of service adoption means taking into account citizens' views, and not just the perspectives of the administrations (which are more clearly concerned with service provision): this is very important for a benchmarking study to be useful to improve e-services. In fact, to improve e-services, it is essential to increase our understanding of citizens' motivations and their satisfaction beyond quantitative metrics, and to determine whether e-services actually play a significant role in the improvement of quality of life. In other words, it is vital to learn directly from citizens. How this can be performed would probably require a lengthy discussion on Human-Computer Interaction techniques, a field moving towards understanding user experience (see for instance [26]), and using "in the wild" strategies [55]. However, this is beyond the scope of the BLM, which is a benchmarking method for the useful comparative evaluation of cities' e-services.

5.5. A new catalogue of smart e-services

With the dawn of the century, *smartness* appeared as an ideal for cities, in which new management based on advanced infrastructures would maximize citizens' quality of life, economic prosperity, energy sustainability and respect for nature [8]. Most proponents of the concept depict it in a different way, as a solution to current challenges: waste management, scarcity of resources, air pollution, human health concerns, traffic congestion, and inadequate, deteriorating and ageing infrastructures, including social ones. Cities label as *smart* the most innovative ways to manage these problems [13].

The concept relies mainly on the appearance of new, diverse, cheaper sensors that provide substantial quantities of urban environment data, which could be useful to run a city. Most definitions focus on the role of ICT infrastructures, but some stress human capital and education, social and relational capital, and environmental interest [18]. Nevertheless, the smart city concept remains fuzzy [12], and its meaning has been changing, so there is no commonly agreed definition as yet [18]. This lack of consensus is obviously a clear obstacle to identifying a real smart city [30]. Our main focus [45] defines, perhaps too widely, a smart city service as any innovative service using ICT in an urban habitat.

The availability of large amounts of data generated by new sensors or by users (human sensors) does not lead per se to new or improved e-services, although it establishes the basis for a better government. It seems convenient to stick to basics to get a clearer picture. For instance, Rogers claims that *"Communication technologies are transforming our economies, our ways of learning, our methods of work, our capacity to alter the environment and even our daily chores and pleasures; they are unmistakably reshaping our lives"* [54, p. 147]. Now, citizens' minds and sophisticated technologies replace raw materials and brawn: *"The networking of creativity is now driving the new 'creative' economy. Exchanges between art and technology -the exchange of ideas rather than of commodities- are becoming the lifeblood of the new economy and of our future prosperity"* [54, p. 162]. Let us reflect on how these general ideas are shown through specific changes in local e-services.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 14

First, smart city dwellers and workers use smart services for their daily activities regardless of time or place: citizens use them to meet their daily needs, companies and people carrying out economic activities in the city use them to improve their businesses, and city managers and public service operators use them to ensure high quality public service provision and city maintenance. Thus, services cover more activities, and are used ubiquitously. Second, e-service provision itself has been evolving in two aspects that need to be analysed: city administrations now provide e-services in different ways; and e-services of public interest have emerged that are provided by new players, the citizens, the civic sector and companies. E-services analysis needs a new basis in this landscape [17]. The traditional analysis, centred on e-government offerings, should be extended to cover the new formulas of public provision based on public-private partnerships [21], and offerings by voluntary citizens and the third sector – which are especially relevant with regards to improved e-governance. Research should move from the study of public organizations to a more holistic analysis of the whole digital city creative ecosystem, as anticipated by [2].

E-services have been strongly influenced by the app explosion. Mobile applications, or apps, run on mobile devices such as smart phones and tablets [57]. Apps are small, cheap, purpose-specific, functionally restricted and have simple user interaction. The apps phenomenon is due to several factors, including new and more powerful devices, high bandwidth wireless technologies, and the creativity of developers [62]. A study [17] states that Web 2.0, Open Data and Open Infrastructures are also boosting the creation of new apps. Although apps provide services that meet very specific needs, often for small groups of citizens, their impact on quality of life is perceived positively. Citizens adopt them because they seem easier and more efficient: they require fewer resources in terms of time and/or money and yield better results. Users are adopting them to meet their current basic needs (housing, food, employment, safety and health, among others), their secondary needs (mobility and access to information) or their personal needs (culture, leisure, hedonism, ambition, friendship, anonymity, social recognition, etc.) [40].

Some apps created by citizens and private companies are becoming real services of public interest, used by citizens. Some are strong competitors of government e-services, while others go beyond those provided by the public administration. This blurs the borders of e-government, and changes the dominant position of governments as providers of e-services. In fact, city governments risk becoming marginal providers, only of legally established public e-services.

This situation has encouraged city administrations to provide traditional e-services as apps too, and to increase efforts to introduce more personalized delivery [52]. In addition, city councils intend to position themselves as prescribers of third party urban e-services, as illustrated by the initiatives Apps for Amsterdam,[5] Helsinki App Store[6] or Barcelona's Apps4BCN.[7] Cities are also actively engaging citizens and companies in the creation of apps of public interest through contests. If we examine our initial research stages on the e-services provided by Barcelona, the main novelty seems to be the offering of a variety of mobile e-services delivered through smart phones, which have been specifically designed for the new channel. They support the devices' design logic to create a better user experience, and are not just a port for existing e-services. In other words, the services themselves have been redefined or deeply transformed.

[5] http://www.appsforamsterdam.nl.
[6] http://apps.hel.fi.
[7] http://www.app4bcn.cat.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 15

Recently [45], reviewed and analysed existing taxonomies for classifying e-services in smart cities, and proposed a new typological framework that has four dimensions: technology mode, service purpose, service authority, and delivery mode, resulting in 17 classification categories. This classification is citizen-centric, and borrows the "purpose of consumption" concept from marketing. As it contains characteristics that we discussed earlier in the new e-services, it could be an interesting starting point for the development of a new bottom-up catalogue. A new catalogue would also need empirical data on smart city services that are currently provided in a variety of cities, but there is no such study, to the best of our knowledge. This new catalogue could be the basis of a useful local e-services benchmarking study.

6. Conclusions

Benchmarking studies based on indexes offer very limited understanding of e-government for both managers and academics. BLM is a novel, non-competitive local e-services benchmarking methodology, which should be more useful to understand e-services and better help city managers to improve those they offer. A pilot benchmarking based on BLM was undertaken in 2008–2009, and an online survey was administered to its participants in 2013–2014. The survey intended to assess the actual effectiveness of the benchmarking on improving their e-services, either actually implemented or planned, and the role played by the different features of BLM in helping managers to better understand their cities' characteristics, and to identify good practices to learn from.

The paper has discussed the results of the survey. We have shown that BLM benchmarking actually helped city managers towards planning or implementing e-services improvement. We have shown that administrators understood better the level and performance of their e-services offer (including adoption by citizens) on the basis of the rich information the BLM benchmarking provides; and that the information on best practices helped towards the e-services improvement.

We have discussed two key shortcomings of the benchmarking methodology revealed by the survey, the bottom-up e-services catalogue and how to measure adoption by citizens. In recent years cities introduced quantitative measurements of e-services use, but more research on good indicators to measure adoption by citizens is needed. We discussed different aspects of the novelties of smart e-services, both in terms of their new characteristics (mobility, ubiquity, etc.) and the new actors that provide them (public-private partnerships, third sector organisations and citizens). Based on new methodological approaches to e-service taxonomies that the paper reviews, we claim that more field data is needed to build a new smart e-services catalogue on which a useful benchmarking would lead to actual learning, better understanding, and planning the implementation of improved Smart Cities. The new smart e-services also pose new challenges for measuring adoption. This opened up significant number of research questions, and we identified some avenues to answer them, necessarily based on further research built on collecting and analysing data. Beyond the novel benchmarking useful to improved e-services, complementary research aimed at deep understanding of citizens' motivations for its use, how they rate them and the added value they provide will be also useful and necessary.

References

[1] Ammons DN. A proper mentality for benchmarking, *Public Administration Review*. 1999, 105-109.
[2] Aurigi A. Tensions in the digital city, *Town and Country Planning*. 2005; 74(4): 143-145.

[3] Bannister F. The curse of the benchmark: An assessment of the validity and value of e-government comparisons. *International Review of Administrative Sciences.* 2007; 73(2): 171.
[4] Batlle J, Calderón R, López J. *Local e-government bench-learning survey.* Final Report of the EUROCITIES Working Group, 2009. [online] Available at: <http://www.eurocities.eu/eurocities/publications/governament-Benchlearning-final-report-WSPO-8PM4ET> [Accessed 24 October 2013].
[5] Batlle-Montserrat J, Abadal E, Blat J. *Benchmarking del e-gobierno local: limitaciones de los sistemas de evaluación comparativa.* El profesional de la información, 2011, May–June, v. 20, n. 3, pp. 251-259. DOI: 10.3145/epi 2011.May.02.
[6] Batlle-Montserrat J, Blat J, Abadal E. Benchmarking Municipal E-Government Services: A Bottom-Up Methodology and Pilot Results. *International Journal of Electronic Government Research.* 2014; 10(4): 57-75.
[7] Baum C, Di Maio A. Gartner's four phases of e-government model. *Stamford, Ct., Gartner Group.* 2000; 21: 12-6113.
[8] Bowerman B et al. The vision of a smart city. In *2nd International Life Extension Technology Workshop, Paris.* 2000.
[9] CapGemini Ernst & Young, *Online availability of public services: How is Europe progressing*? Brussels: European Commission, 2003.
[10] CapGemini Ernst & Young, *Smarter, faster, better e-Government. 8th e-Government benchmark measurement.* Brussels: European Commission, 2009.
[11] CapGemini Ernst & Young, *Public Services Online: Digital by Default or by Detour? Assessing User Centric eGovernment performance in Europe – eGovernment Benchmark 2012.* Brussels: European Commission, 2013.
[12] Caragliu A, Del Bo C, Nijkamp P. Smart cities in Europe. *Journal of Urban Technology.* 2011; 18(2): 65-82.
[13] Chourabi H et al., Understanding Smart Cities: An Integrative Framework. *45th Hawaii International Conference on System Sciences,* 2013.
[14] Codagnone C, Caldarelli L, Cilli V, Galasso G, Zanchi F, *Compendium to the measurement framework. eGovernment economics project.* Rome: eGEP Consortium 2006.
[15] Codagnone C, Undheim TA. Benchmarking e-Government: Tools, theory, and practice. European Journal of ePractice, 4 (August). 2008. [online] Available at: <http://www.epractice.eu/files/ePractice-Journal-Volume-4_0.pdf> [Accessed 1 November 2014].
[16] Cole MI, Parston G, *Unlocking public value: A new model for achieving high performance in public service organizations* Wiley, 2006.
[17] De Kool D, Van Wamelen J, Web 2.0: a new basis for e-government?, *Information and Communication Technologies: From Theory to Applications, 2008. ICTTA 2008. 3rd International Conference on Information & Communication Technologies.* IEEE, 2008. 1-7.
[18] De Santis R, Fasano A, Mignolli N, Villa A, *Smart city: fact and fiction,* 2014. [online] Available at: <http://mpra.ub.uni-muenchen.de/54536/> [Accessed 1 March 2015].
[19] Fath-Allah A, Cheikhi L, Al-Qutaish RE, Idri A, e-Government maturity models: a comparative study. *International Journal of Software Engineering & Applications* 2014; 5(3): 71-91 http://airccse.org/journal/ijsea/papers/5314ijsea06.pdf.
[20] Flak LS, Olsen DH, Wolcott P, Local E-government in Norway. *Scandinavian Journal of Information Systems.* 2005; 17(2): 41-84.
[21] Frug GE, City services. *NYUL Rev.* 1998, 73: 23.
[22] Gallego-Álvarez I, Rodríguez-Domínguez L, García-Sánchez I, Are determining factors of municipal E-government common to a worldwide municipal view? An intra-country comparison. *Government Information Quarterly.* 2010; 27: 423-430.
[23] Griffin D, Foster A, Halpin , Joined-up e-government: An exploratory study of UK local government progress. *Journal of Information Science and Technology.* 2004, 2.
[24] Giffinger R, Gudrun H, Smart cities ranking: an effective instrument for the positioning of the cities? (2009).
[25] Giffinger R, Fertner C, Kramar H, Kalasek R, Pichler-Milanovic N, Meijers E, Smart cities – Ranking of European medium-sized cities. Vienna University of Technology, 2007.
[26] Hassenzahl M, *Experience Design: Technology for all the right reasons*, Morgan & Claypool, San Rafael (Calif.), 2010.
[27] Heeks R, Information systems and developing countries: Failure, success, and local improvisations. *The Information Society* 2002; 18(2): 101-112.
[28] Heeks R, Understanding and measuring e-Government: International benchmarking studies. Paper presented at the *UN-DESA Workshop E-Participation and E-Government: Understanding the Present and Creating the Future*, Budapest, 2006; 27-28.
[29] Heeks R, A Better e-Government Maturity Model. 2015. https://ict4dblog.wordpress.com/2015/03/23/a-better-e-government-maturity-model/.
[30] Hollands RG, Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City.* 2008; 12(3): 303-320.
[31] Holzer M, Kim ST, *Digital governance in municipalities worldwide (2007). A longitudinal assessment of municipal web-*

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 17

598 *sites throughout the world.* Newark (New Jersey): The E-Governance Institute. National Center for Public Performance.
599 Rutgers University. 2007.
600 [32] Jansen J, de Vries S, Van Schaik P, The contextual benchmark method: Benchmarking e-government services. *Govern-*
601 *ment Information Quarterly.* 2010; 27(3): 213-219.
602 [33] Janssen D, Mine's bigger than yours: Assessing international e-government benchmarking. Paper presented at the *3rd*
603 *European Conference on e-Government,* MCIL, Reading, MA, 2003; 209-218.
604 [34] Janssen M, Wagenaar R, An analysis of a shared services centre in e-government. Paper presented at the *Proceedings of*
605 *the 37th Annual Hawaii International Conference on System Sciences,* Hawaii. 10. 2004.
606 [35] Kaisara G, Pather S, The e-Government evaluation challenge: A South African Batho Pele-aligned service quality ap-
607 proach. *Government Information Quarterly.* 2011; 28(2): 211-221.
608 [36] Kaufmann D, Kraay A, Mastruzzi M, *Governance matters VIII: Aggregate and individual governance indicators, 1996–*
609 *2008*. Washington: World Bank Institute. 2009.
610 [37] Kaylor C, Deshazo R, Van Eck D, Gauging e-government: A report on implementing services among American cities.
611 *Government Information Quarterly.* 2001; 18(4): 293-307.
612 [38] Kolsaker A, Lee-Kelley L. Citizens' attitudes towards e-government and e-governance: A UK study. *International Jour-*
613 *nal of Public Sector Management.* 2008; 21(7): 723-738.
614 [39] Kourtit K, Macharis C, Nijkamp P. A multi-actor multi-criteria analysis of the performance of global cities. *Applied*
615 *Geography.* 2014; 49: 24-36.
616 [40] Kujala S, Väänänen-Vainio-Mattila K. Value of information systems and products: Understanding the users' perspective
617 and values, *Journal of Information Technology Theory and Application.* 2009; 9(4): 4.
618 [41] Kunstelj M, Vintar M, Evaluating the progress of e-government development: A critical analysis. *Information Polity.*
619 2004; 9(3): 131.
620 [42] Lanvin B, Lewin A, The next frontier of E-government: Local governments may hold the keys to global competition.
621 *Global Information Technology Report.* 2007; (2006): 51-63.
622 [43] Layne K, Lee J, Developing fully functional e-government: A four stage model, *Government Information Quarterly.*
623 2001; 18(2): 122-136.
624 [44] Lee J. 10 year retrospect on stage models of e-government: A qualitative meta-synthesis. *Government Information Quar-*
625 *terly.* 2010; 27(3): 220-230.
626 [45] Lee J. Lee H, Developing and validating a citizen-centric typology for smart city services. *Government Information*
627 *Quarterly.* 2014; 31: S93-S105.
628 [46] Löfstedt U, E-government services in local governments-a study of development in Swedish municipalities. *Journal of*
629 *Organisational Transformation and Social Change.* 2007; 4(2): 157.
630 [47] Moonen T, Clark G, Feenan R, The business of cities 2013: What do 150 city indexes and benchmarking studies tell us
631 about the urban world in 2013? Jones Lang LaSalle, 2013 [online] Available at: <www.jll.com/Research/jll-city-indices-
632 november-2013.pdf > [Accessed 28 February 2015].
633 [48] OECD. Working Paper "E-government as a Tool for Transformation", [GOV/PGC(2007)6], background paper for a
634 meeting at the OECD in Paris, 28 March 2007. [online] Available at: <http://search.oecd.org/officialdocuments/public
635 displaydocumentpdf/?cote=GOV/PGC(2007)6&docLanguage=En> [Accessed 24 October 2013].
636 [49] OECD, *Rethinking e-government services.* Organisation for Economic Co-operation and Development, 2009. doi:10.
637 1787/9789264059412-en.
638 [50] OECD, *Government at a glance 2011*, OECD Publishing, 2011. [online] Available at: <http://dx.doi.org/10.1787/
639 gov_glance-2011-en> [Accessed 24 October 2013].
640 [51] Panopoulou E, Tambouris E, Tarabanis K, A framework for evaluating web sites of public authorities. Paper presented
641 at the *Aslib Proceedings: New Information Perspectives.* 2008; 60(5): 517-546.
642 [52] Purao S, Seng TC, Wu A. Modeling Citizen-Centric Services in Smart Cities, *Conceptual Modeling*. Springer Berlin
643 Heidelberg, 2013, 438-445.
644 [53] Rodriguez JR, Batlle J, Esteban D. *E-government city models: Cases from European cities*. Barcelona: Ajuntament de
645 Barcelona, 2007. ISBN: 978-84-9850-028-8.
646 [54] Rogers, R. Cities for a small planet. UK Faber and Faber Limited, UK, 1997.
647 [55] Rogers Y, Interaction design gone wild: striving for wild theory. *Interactions* 2011; 18(4): 58-62.
648 [56] Rorissa A, Demissie D, Pardo T, Benchmarking e-government: A comparison of frameworks for computing e-
649 government index and ranking. *Government Information Quarterly.* 2011; 28(3): 354-362.
650 [57] Ruiz IJM, *Large-scale empirical studies of mobile apps,* Doctoral dissertation, Queen's University, 2013.
651 [58] Salem F, Benchmarking the e-government bulldozer: beyond measuring the tread marks. *Measuring Business Excellence.*
652 2007; 11(4); 9-22.
653 [59] Schellong A, EU eGovernment Benchmarking 2010+: General remarks on the future of benchmarking Digital Govern-
654 ment in the EU. 2009.

Galley Proof 21/08/2015; 14:22 File: ip366.tex; BOKCTP/ljl p. 18

[60] Shackleton P, Fisher J, Dawson L, Evolution of local government E-services: The applicability of e-business maturity models. Paper presented at the *37th Annual Hawaii International Conference on System Sciences.* 2004; 5-8.
[61] Shareef MA, Kumar V, Kumar U, Dwivedi YK, e-Government adoption model (GAM): Differing service maturity levels. *Government Information Quarterly.* 2011; 28: 17-35.
[62] Sharma C, Sizing up the global mobile apps market. *Report, Chetan Sharma Consulting, Issaquah, WA,* 2010.
[63] Siskos E, Askounis D, Psarras J, Multicriteria decision support for global e-government evaluation. *Omega.* 2014; 46: 51-63.
[64] UN, E-government survey 2010. *Leveraging e-government at a time of financial and economic crisis* No. ST/ESA/PAD/SER.E/131. New York: United Nations, 2010.
[65] UN, E-government survey 2012. E-Government for the People. 2013. [online] Available at: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf> [Accessed 24 October 2013].
[66] UN, E-government survey 2014. *E-Government for the Future We Want.* ST/ESA/PAD/SER.E/188. New York. United Nations 2014.

6. Conclusions

The main objective of this research, which is to demonstrate the possibility of creating a benchmarking methodology specifically tailored to local e-government, with applicability at an international level, essentially non competitive and that reinforces the learning aspects of a comparative evaluation, has been achieved.

The research starts clarifying the basics of e-government and introducing the many and varied aspects of this topic. It notes and justifies the importance of measuring e-government, specially focusing on one of its most developed aspects, comparative evaluation or benchmarking of e-services. The research shows that in the field of e-government, the overwhelming majority benchmarking methodologies rely on e-government stages models as a framework to guide further measurements.

A detailed analysis of the existing e-government benchmarking, most of them currently in use, revealed that only a few of them are tailored to the special characteristics of cities. Among these, very few are specific for e-services, and no surveys have been found comparing both provision and citizen's adoption.

A field research revealed the main characteristics for a benchmarking methodology of e-services to be useful for city managers. A good comparative evaluation of local level e-administration should cover the breadth and variety of services and tasks (e.g. traffic management, waste collection, etc.) performed by these administration. It should rely on an updated e-government model including new trends in service delivery (e.g. user interactivity, citizens contributions, proactivity, higher levels of integration). It should consider the service provision not only through the web channel, but also through all the new digital channels that are being used (e.g. webTV, kiosks, mobile apps). The methodology should measure and compare both the service offer and the adoption by citizens. And finally, it should offer the results in a more detailed view and, at the same time, less competitive than traditional rankings to maximize learning aspects and make identifying and spreading good practices easier.

Another part of the research has demonstrated the existence of a corpus of services that are common to European cities. Thus setting the basis for a comparative evaluation of local e-administration based on comparing similar e-government services instead of similar organizations.

A methodology for benchmarking the local level e-administration in Europe has been designed following a bottom-up process. The methodology, called Bench-learning methodology guides benchmarked organizations through a non competitive learning process. The learning process finalises with the identification of potentially good practices for each of the service categories, that are prone to being used as accelerators in the process of implementing and improving local e-services.

The methodology is heavily user-centred, making use of city managers' requirements and thus goes beyond traditional academic oriented surveys, which are not useful enough for practitioners (Janssen & Wagenaar, 2004; Heeks, 2006; Bannister, 2007).

In the benchmarking process, an important number of intermediate results help city managers to understand the position of their organizations in different areas of e-services and open up different working lines for improvement. The results promote the understanding of each city in the overall context of e-government development and adoption, never making a direct comparison of one city against another.

The specific innovations of the Bench-learning methodology are:

1. It is based on comparing similar services instead of similar organizations.

2. The comparison is based on a catalogue of common services that includes not only the basic services, but also the most advanced services to take account of city innovation trends.

3. The catalogue is built following a bottom-up process with the cities.

4. The benchmarking measures not only the service provision and maturity, but also the citizens' adoption. Both provision and adoption are related to assessing the e-service development in each city.

5. Instead of presenting the results as an aggregated index and the subsequent competitive ranking. Each city is profiled against a variety of global averages, accompanied by a variety of indicators.

6. A set of objective indicators lead to a qualified list suggesting good practices.

The Bench-learning methodology has been validated by performing a test in 15 local government organizations in 10 European countries with rather different legal frameworks. The results prove the suitability of the methodology. It is also a suitable tool for practitioners to learn from the cities that are doing things better, which is key to e-government success as pointed out by Janssen and Wagenaar (2004). The results obtained in this pilot measurement have been amply discussed.

In a new field research, four years after, the impact and limitations of the methodology have been analysed. The results of this second survey confirm that the Bench-learning qualities helped managers to understand their e-government characteristics better, and to identify practices interesting for improving their e-services, what they actually did or planned. In addition, the survey revealed methodological improvements, the need to update the service catalogue and a widespread quantitative measurement of adoption by cities.

Finally, the smart city phenomenon and its impact on the e-service provided by city government has been analysed. The second survey performed to assess the real impact of the Bench-learning pilot measurement confirmed a dramatically changed panorama of new

smart e-services. At the same time, it revealed the interest of city managers in an update of the catalogue of services.

This dissertation discussed different aspects of the novelties of smart cities in the field of smart e-services. Besides new methodological approaches in e-services taxonomies, that are also commented on, the work proposed that more field data was needed to build a new e-services catalogue in which benchmarking would be a learning exercise. The new smart e-services also pose new challenges for measuring their adoption, which is both necessary and scarcely undertaken. This opens a wealth of significant questions, where a lot of research built on collected data is necessary.

Therefore, the research confirms that it is possible to define a specific methodology to develop comparative evaluations of local e-government at an international level (H1). It shows that the European cities are sharing an important corpus of common services, which makes it possible to perform a comparison based on similar services instead of similar organizations. This has been the starting point for designing the Bench-learning methodology.

As it has been explained in the introduction of this research, should such a methodology exist, then it should allow to answer some important questions regarding how cities are developing their e-government agendas. These questions have been introduced in this dissertation as research hypotheses.

The analysis of the results of the pilot measurement carried out in 15 European cities allow the research hypotheses to be answered.

H2: The most mature or sophisticated services are also the most widespread.

The first impression seems that the more mature or sophisticated a service is, the more it is used by citizens. Data obtained in the pilot measurement confirms this hypothesis since it shows a correlation between service's maturity and perception of adoption for those basic or standard services. But does not confirm it for the additional services that seem to follow other rules and motivations for their use.

H3: Cities are developing additional and more sophisticated services to attract citizens' attention.

There is a trend towards creating special and sophisticated services to attract citizens interest and raise citizens awareness towards new electronic channels. It is a strategy to push for a channel shift in service provision. The research confirms this trend, showing that, in almost all the categories, additional services are more sophisticated than standard services.

H4: Additional services are more adopted than standard services.

Additional services are not mainstream services. Usually they are more attractive than standard services because they have been built to attract citizens' attention and raise citizens' awareness about the new channels. The results show that adoption levels are very similar among standard and additional services, with the exception of a couple of categories. Therefore, the research cannot confirm this hypothesis.

H5: Big cities are performing better than small cities in e-government services.

Although there is the perception that small cities are quicker in adopting innovation and show less reluctance to change, Moon & Norris (2005) argue that large city governments are more prone to adopting e-government activities because they receive more pressure to find ways of providing public services and disclosing information.

In general, it can be said that the number of public services a city should provide to its citizens is the same, no matter the size of the city. Nevertheless, the research shows that big cities defined e-government strategies better and deployed more and better e-government services. The research confirms that big cities offer more mature e-services than small and medium-sized cities. The research also confirms that the citizens of those large cities are more prone to using e-government services, thus showing higher rates of citizen's adoption. The e-service offer of the big cities is, at the same time, more balanced, which means that all the areas or service categories are well populated and the services are in quite a similar level of maturity.

In fact, these hypotheses have been confirmed or refuted based only on the results of the first pilot benchmarking based on the Benchlearning Methodology, and the foreseen larger scale second and third benchmarking rounds did not take place in the framework of an economic crisis. As discussed previously, these results would need these rounds to reach statistical significance. Nevertheless, to be able to discuss the hypotheses confirms the validity and shows the potentialities of such a methodology.

7. Future Work

This research opens up lots of new questions that require further research that unfortunately goes beyond the initial scope. This chapter discusses how future research would be organized to answer these questions.

The future research is structured in two research lines around the Bench-learning methodology. The first one focuses on the field of traditional e-government services. It aims at consolidating the Bench-learning methodology as a recognized methodology to benchmark local e-government services in Europe. The second one focuses on smart cities. It aims to transform the Bench-learning methodology into a methodology for benchmarking smart city e-services.

The first research line will be carried out by improving the methodology to overcome the current limitations discussed previously, by extracting more information from the data gathered in the future, and increasing the statistical significance of the results through a new measurement in a more extensive sample of cities.

The refinement or improvement of the methodology would focus on the service catalogue, the e-government model, the measurement of adoption, the data collection, the data analysis, and the visualisation of the results.

The revision and updating of the service catalogue includes more services and the new channels for the delivery of services. The service catalogue would be improved by means of a more accurate definition of categories. According to Klischewski (2003b), semantic web technologies might help to establish a common ground for semantic interoperability by bringing in public services ontologies that formalize service definition and contribute to the identification of different domains of interest that can be mapped with the categories of the catalogue.

The e-government model used to assess service maturity should be replaced by one targeted more towards e-services. The Bench-learning methodology used a maturity model based on Gartner's e-government model (Baum & Di Maio, 2000) extended with a fifth level of maturity (Lee, 2010). A significant number of services (12 out of 81) were found in that maturity level. This fact demonstrates the appropriateness of the extension of the e-government model. Nevertheless, the use of this stages model should be revised, since measuring maturity was one of the points whose improvement was suggested by city managers. Indeed, there are other e-government models that describe the maturity better, as well as the level of integration of e-services (Heeks, 2015). These e-government models should be strongly considered when improving the current one.

The Bench-learning methodology proposed assessing perceived adoption to tackle the absence of objective adoption information. Nevertheless, this solution offers limited adoption measures. Four years after performing the pilot measurement, the metrics to measure the service usage have become more extended although not yet adopted by all the

cities. Despite the fact that these metrics do not directly provide a framework to measure service adoption, their general use is a significant step forward. The definition of a framework to assess service adoption should be a priority in future research.

Improving the tools and process for data collection based on self-assessment should be a must. Research should provide better complementary measures so as to increase data quality and reduce any bias on this data. Measures such as creating small assessment projects with a multidisciplinary team of people from each participating organization (Valdés, et al., 2011), or by providing better training to evaluators, or using statistical methods to discard some of the answers (Lin, Fofanah & Liang, 2011; Gauld, Goldfinch & Horsburgh, 2010; Shareef, et al., 2011) should be considered.

With a more extensive sample of cities, it becomes an issue that in international benchmarking variables could not be crispy defined or even understood in the same way. Indeed our research shows how scarce is the use of metrics for adoption measurement, perhaps due to this heterogeneity, which limits the quantitative comparisons. In addition, the different cities have different social, economic and political contexts. In such scenario, fuzzy sets methods (Ragin, 2013) could be an approach worth exploring as a more appropriate comparative methodology, as it might complement the benchmarking results with a more detailed analysis based on the diversity existing among the cities. This would help both to understand better the development level of the European Local e-government as well as to characterize better the good practices. It would allow to extract even more information from the data gathered, thus increasing the learning aspects of a benchmarking and therefore, the impact of such exercise.

Further research should also be devoted to improving the visualization of the benchmarking results as have been suggested by managers.

Furthermore, a new benchmarking at a European level based on the Bench-learning methodology should be performed in a larger sample of cities. A larger sample of cities would not only increase the statistical significance of the results, but also enrich the results by allowing a more refined segment analysis according to the different city characteristics.

Two new measurements based on the Bench-learning methodology were planned during the research to refine the methodology as well as to test it in a more uniform sample of cities. Both surveys were interesting benchmarking exercises, although the international dimension was missing. Unfortunately neither of these two surveys was carried out. The first measurement was planned to be carried out with a sample of small and medium-sized cities in Catalonia. It would have been useful to check whether the methodology was consistent in a sample of small and mediums cities in a rather homogeneous situation. However, it was cancelled due to the change of the political party in front of Localret[5].The second one was planned to benchmarking the cities of the Barcelona metropolitan area. It would have brought information about the e-government services in the great Barcelona

5 Locaret is a consortium of the Catalan local public organizations that was created to promote the information society development the municipalities of Catalonia. Currently, it has more than 800 members that is more than 84% of the Catalan municipalities.

area. Unfortunately, it was not launched due to a lack of agreement with the AMB[6] responsible.

The second research line focuses on smart cities and aims to transform the Bench-learning methodology into a benchmarking methodology for smart city e-services. A benchmarking methodology that would inform about the progress of a smart city by analysing and comparing the existing smart services. Here, smart service or smart e-service mean any innovative service using ICT in an urban habitat. This definition, perhaps too wide, includes the e-services provided by the public organizations plus the services of public interest developed as apps by other actors and used by city dwellers and workers in their daily activities regardless of time or place.

The research performed and exposed in this PhD dissertation confirmed a dramatically changed panorama of new smart e-services. The research has discussed different aspects of the novelties in smart e-services, both in terms of their intrinsic characteristics and the new actors providing them. Nevertheless, further research is needed to discover how smart city phenomenon impacts on local e-government, that is, in public services provision and use, and the governance changes that arise in this new scenario. It is still to be determined whether smart services are at higher stages of maturity than traditional public services, and how the progress and benefits that new services bring to the society could be measured. It is also important to investigate how cities can be characterized by the offer of e-services (including both traditional e-government services and smart services), and whether can be assessed the level of development of a smart city by measuring its smart services.

The methodology for this research line would be based on three main steps: analysis, design and validation.

1. Designing a methodology to benchmark smart cities in terms of their smart services by classifying the services according to a taxonomy, establishing a model of maturity, and investigating the new challenges for measuring their adoption, which is both necessary and scarcely undertaken.

2. Validating the methodology performing a measurement including smart services and new services of public interest in a sample of recognized European smart cities.

3. Analysing the smart city phenomenon from the point of view of electronic services. That is to say, to identify existing electronic services (going beyond those offered by the city government) and their main characteristics. Understanding the impact on public services provision and identifying the services that contribute to the transition towards a smart city.

6 AMB stands for Area Metropolitana de Barcelona. It is an intermediate public body that coordinates and provides some public service related to territory and urban planning, mobility, housing, environment economic development and social cohesion to the 36 municipalities of the Metropolitan Area of Barcelona.

For the analysis of the smart city phenomenon it is worth starting by asking what makes a city more comfortable or more liveable to its dwellers, more business friendly and more attractive to visitors. Therefore, what makes a city better. Here, it makes sense to analyse citizens' needs, and take into consideration User Experience and Citizen Experience techniques.

A second step should look for online services that are present in a smart city. A smart city is characterized among other things by the availability of a set of electronic services that are unavailable in traditional cities. These services play a key role in improving the citizen's quality of life as well as preserving the environment (probably, the services that are facilitating business activity and those that are making the city more attractive to the visitors should be added).

A service improves citizen's quality of life when it allows a citizen to meet its needs in a more efficient way (e.g. less resources: less time, less money, better quality). Therefore, research should also take into consideration Maslow's hierarchy of needs and other models analysing citizen's needs.

These services have common characteristics that allow us to identify them:

1. They are focused on meeting very specific needs of citizens (or a very specific group of people) by an intensive use of technology which complexity is hidden to the user.

2. These services maintain a strong bond with the territory. They are based on specific information about the city. Therefore, despite being accessible from everywhere, they often fail to make sense out of the city's geographical area.

3. They go beyond the traditional boundaries of e-government or obligations established by the local government legislation, and are offered by a variety of actors not always associated with public.

The research would take into account the transformational impact of these services on the citizens' lives and over the internal processes of the administration. That is how the emerging apps are changing urban life, mobility, working methods, planning, buying or consuming leisure or even citizens' decision-taking or the transformation of the citizen's motivations.

A methodology to benchmark smart cities in terms of their smart services would be designed by classifying the services according to a taxonomy, establishing a model of maturity, and investigate the new challenges for measuring their adoption, which is both necessary and scarcely undertaken.

A new catalogue of services should be built from bottom-up including all the smart services, therefore braking the traditional boundaries of e-government. As explained above, the services that can be included under the umbrella of e-government have changed

significantly. If we adhere only to the e-government services and discard all those innovative services, then the results run the risk of becoming of little interest. Now more than before, the answer cannot be given by the current legal framework. Here, again, the analysis or comparison with what happens in other countries (e.g. Republic of Korea, Japan, Canada or Australia) can be of help.

Finally, the methodology should be validated by performing a measurement in a sample of recognized European smart cities. The definition of the catalogue of services and the data gathering would be managed following the previous experience defining the Bench-learning methodology.

This research line could end up revealing whether there is a new e-government that can be called smart e-government, or just questioning what the current limits of e-government are in cities.

8. References

Aichholzer, G., Schmutzer, R., and Hochgerner, J. (1998). Bringing public administration closer to the citizens. Paper presented at the Background Paper to the Conference of the Information Society Forum of the European Commission. Wien.

Albino, V., Berardi, U. and Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. Journal of Urban Technology, 22(1), 3-21.

Al-Hashmi, A., and Darem, A. B. (2008). Understanding phases of E-government project.Emerging Technologies in E-Government.

Alshawy, S., Alahmary, A., and Alalwany, H. (2007). eGovernment evaluation factor. citizens perspective. Paper presented at the Proceedings of the European and Mediterranean Conference on Information Systems 2007, Spain.

Alsuwaidi, H. (2009). Evaluating the factors affecting for the adoption of E-government services in the public sector (UAE).

Ammons, D. N. (1999). A proper mentality for benchmarking. Public Administration Review, 105-109.

Andersen, K. V.; Henriksen, H. Z. (2006). E-government maturity models: extension of the layne and lee model. Government Information Quarterly, 23(2), 236.

Anttiroiko, A. (2010). Innovation in democratic e-governance: Benefiting from web 2.0 applications in the public sector. International Journal of Electronic Government Research (IJEGR), 6(2), 18-36.

Apostolou, D., Stojanovic, L., Pariente-Lobo, T., Batlle, J., and Papadakis, A. E. (2005). Configuring e-government services using ontologies. UPGRADE. the European Journal for the Informatics Professional, 6(6).

Arslan, A., (2007). Turkish local e-governments: A longitudinal study. The Electronic Journal of e-Government, 5(2), 95-106.

Aurigi, A. (2005). Tensions in the digital city. Town and Country Planning 74(4), 143-145.

Baldersheim, Harald.(2014). Does 'e' Make a Difference? Smart Cities = Smart Citizens?.ECPR General Conference, Bordeaux 4th-7th. September 2013

Bannister, F. (2007). The curse of the benchmark: An assessment of the validity and value of e-government comparisons. International Review of Administrative Sciences, 73(2), 171.

Batlle-Montserrat, J., Abadal, E. and Blat, J. (2011). Benchmarking del e-gobierno local: limitaciones de los sistemas de evaluación comparativa. El profesional de la información, 2011, mayo-junio, v. 20, n. 3, pp. 251-259. DOI: 10.3145/epi 2011.may.02.

Batlle-Montserrat, J., Blat, J., and Abadal, E. (2014). Benchmarking Municipal E-Government Services: A Bottom-Up Methodology and Pilot Results. International Journal of Electronic Government Research, 10(4), 57-75.

Batlle-Montserrat, J., Blat, J. and Abadal, E. (2015). Towards benchmarking smart city services: impact analysis and methodology improvements for local e-government benchlearning. Information Polity, 2015. (Pending to be published by Information Polity).

Batlle-Montserrat, J., Calderón, R. and Gascó, M. (2008). E-Government Bench-learning Project. In Collaboration and the Knowledge Economy: Issues, Applications, Case Studies. Proceedings e-Challenges 2008. IOS Press, 2008. Amsterdam. ISBN 978–1–58603–924-0.

Batlle, J., Calderón, R., and López, J. (2009). Local e-government bench-learning survey. Final Report of the EUROCITIES Working Group.

Batlle-Montserrat, J., Merino-Zapirain, I. and Paternain-Soler, C. (2008). ICING: Building the Cities of the Future. UPGRADE Vol. IX, No. 4, August 2008.

Baum, C. and Di Maio, A. (2000). Gartner's four phases of e-government model. Stamford, Ct., Gartner Group, 21, 12-6113.

Belanger, F., and Carter, L. (2008). Trust and risk in e-government adoption. Journal of Strategic Information Systems.

Benkler, Y. (2006). The wealth of networks: How social production transforms markets and freedom. Yale University Press.

Bowerman, B. et al (2000). The vision of a smart city. 2nd International Life Extension Technology Workshop, Paris.

CapGemini Ernst and Young (2002). Online availability of public services: How does Europe progress. Brussels: European Commission.

CapGemini Ernst and Young (2003). Online availability of public services: How is Europe progressing. Brussels: European Commission.

CapGemini Ernst and Young (2004). Online availability of public services: How is Europe progressing. Brussels: European Commission.

CapGemini Ernst and Young (2005). Online availability of public services: How is Europe progressing. Brussels: European Commission.

CapGemini Ernst and Young (2006). Online availability of public services: How is Europe progressing? Report of the 6th measurement. Brussels: European Commission.

CapGemini Ernst and Young (2007). Benchmarking the supply of online public services. 7th measurement. Brussels: European Commission.

CapGemini Ernst and Young (2009). Smarter, faster, better e-Government. 8th e-Government benchmark measurement. Brussels: European Commission.

CapGemini Ernst and Young (2013). Public Services Online: Digital by Default or by Detour? Assessing User Centric eGovernment performance in Europe – eGovernment Benchmark 2012. Brussels: European Commission.

Caragliu, A., Del Bo, C. and Nijkamp, P. (2011). Smart cities in Europe. Journal of urban technology 18.2: 65-82.

Carter, L., and Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. Information Systems Journal, 15(1), 5-25.

Chaín, C.; Muñoz Cañavate, A. (2004). La Administración local española en Internet: estudio cuantitativo de la evolución de los sistemas de información webs de los ayuntamientos (1997-2002). Ciencias de la Información, 35(1), 43-55.

Chaín, C.; Muñoz Cañavate, A.; Más, A. (2008). La gestión de información en las sedes web de los ayuntamientos españoles. Revista española de documentación científica, octubre-diciembre, 31(4), 612-638.

Chourabi, H. et al (2013). Understanding Smart Cities: An Integrative Framework. 45th Hawaii International Conference on System Sciences.

Claver-Cortés, E.; Juana-Espinosa, S. de; Tari, J. J. (2008). E-government maturity at spanish local levels. International Journal of Value Chain Management, 2(1), 4-17.

Codagnone, C., and Undheim, T. A. (2008). Benchmarking e-Government: Tools, theory, and practice. European Journal of ePractice, 4 (August).

Codagnone, C., Caldarelli, L., Cilli, V., Galasso, G. and Zanchi, F. (2006). Compendium to the measurement framework. eGovernment economics project. Rome: eGEP Consortium.

Cohen, B (2012) http://www.fastcoexist.com/1680538/what-exactly-is-a-smart-city

Cole, M.I. and Parston, G. (2006). Unlocking public value: A new model for achieving high performance in public service organizations Wiley.

Cullen, R., and Houghton, J. (2000). Democracy online: An assessment of new zealand government web sites. Government Information Quarterly, 17(3), 243-67.

Criado, J. I. (2009). Nuevos enfoques en el estudio de la administración electrónica. neoinstitucionalismo y tecnologías de información y comunicación e internet en las administraciones públicas.

De Kool, D. and Van Wamelen, J. (2008). "Web 2.0: a new basis for e-government?." Information and Communication Technologies: From Theory to Applications, 2008. ICTTA 2008. 3rd International Conference on. IEEE, 2008.

De Santis, R., Fasano, A., Mignolli, N. and Villa, A. (2014): Smart city: fact and fiction.

Dunleavy, P., Margetts, H., Bastow, S., and Tinkler, J. (2006). Digital Era Governance. IT Corporations, the State and e-Government. Oxford University Press.

European Commission (2000). eEurope 2002 an information society for all. action plan. Brussels: Commission of the European Communities.

European Commission (2002). eEurope 2005: Benchmarking indicators No. COM(2002) 655). Brussels: Commission of the European Communities.

European Commission (2006). i2010 eGovernment action plan: Accelerating eGovernment in europe for the benefit of all No. COM(2006)173). Brussels: Commission of the European Communities.

European Commission (2007). eGovernment progress in EU27+: Reaping the benefits. Brussels: Commission of the European Communities.

Fath-Allah, A., Cheikhi, L., Al-Qutaish, R. E. and Idri, A. (2014). e-Government maturity models: a comparative study, International Journal of Software Engineering and Applications, 5(3), 71–91

Flak, L.S., Olsen, D.H. and Wolcott, P. (2005). Local E-government in Norway. Scandinavian Journal of Information Systems, 17(2), 41-84.

Forest, F., Lavoisy, O., Eurich, M., Van Gurp, J., and Wilson, D. (2009). Roadmap for real world internet applications.

Frug, Gerald E. City services. NYUL Rev. 73 (1998): 23.

Gallego-Álvarez, I., Rodríguez-Domínguez, L. and García-Sánchez, I. (2010). Are determining factors of municipal E-government common to a worldwide municipal view? an intra-country comparison. Government Information Quarterly, (27), 423-430.

Gascó, M. (2003). New technologies and institutional change in public administration. Social Science Computer Review, 21(1), 6.

Gauld, R., Goldfinch, S., and Horsburgh, S. (2010). Do they want it? do they use it? the demand-side of e-government in Australia and New Zealand. Government Information Quarterly, 27(2), 177-186.

Griffin, D., Foster, A.and Halpin, E. (2004). Joined-up e-government: An exploratory study of UK local government progress. Journal of Information Science and Technology, 2.

Giffinger, R., and Gudrun, H. (2009). Smart cities ranking: an effective instrument for the positioning of the cities?.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., and Meijers, E. (2007). Smart cities-Ranking of European medium-sized cities. Vienna University of Technology.

Gilbert, D., Balestrini, P., and Littleboy, D. (2004). Barriers and benefits in the adoption of e-government. International Journal of Public Sector Management, 17(4), 286-301.

Graafland-Essers, I., and Ettedgui, E. (2003). Benchmarking e-government in europe and the US. statistical indicators benchmarking the information society project. Cambridge (UK): RAND Europe.

Greenfield, A. (2006). Everyware: The dawning age of ubiquitous computing. New Riders.

Griffin, D., Foster, A. and Halpin, E. (2004). Joined-up e-government: An exploratory study of UK local government progress. Journal of Information Science and Technology, 2.

Guerrini, W. (2010). E-government and online government-citizen interaction. E-Governance: Electronic Administration and Democracy. GADE,

Gupta, M. P., and Jana, D. (2003). E-government evaluation: A framework and case study. Government Information Quarterly, 20(4), 365.

Hachigian, N. (2002). Roadmap for E-government in the developing world: 10 question E-government leaders should ask themselves. Los Angeles, CA: Pacific Council on International Policy.

Hartley, J. (2005). Innovation in governance and public services: Past and present. Public Money and Management, 25(1), 27-34.

Hassenzahl, M.(2010). Experience Design: Technology for all the right reasons, Morgan & Claypool, San Rafael (Calif.).

Heeks, R. (2002). Information systems and developing countries: Failure, success, and local improvisations. The Information Society 18(2), 101–112.

Heeks, R. (2006). Understanding and measuring e-Government: International benchmarking studies. Paper presented at the UNDESA Workshop E-Participation and E-Government: Understanding the Present and Creating the Future, Budapest, 27-28.

Heeks, R. (2015). A Better e-Government Maturity Model. https://ict4dblog.wordpress.com/2015/03/23/a-better-e-government-maturity-model/

Hicks, R., (2010). Korea Tops UN Recession-Time E-Govt Rankings.

Hiller, J. S.; Belanger, F. (2001). Privacy strategies for electronic government. E-Government, 2001, pp. 162-198.

Hollands, R.G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?. City 12.3: 303-320.

Holzer, M.and Kim, S.T. (2003). Digital governance in municipalities worldwide: an assessment of municipal web sites throughout the world. Newark (New Jersey): The E-Governance Institute. Rutgers University.

Holzer, M., and Kim, S. T. (2005). Digital governance in municipalities worldwide (2005). A longitudinal assessment of municipal web sites throughout the world. Newark (New Jersey): The E-Governance Institute. National Center for Public Productivity. Rutgers University.

Holzer, M. and Kim, S.T. (2007). Digital governance in municipalities worldwide (2007). A longitudinal assessment of municipal websites throughout the world. Newark (New Jersey): The E-Governance Institute. National Center for Public Performance. Rutgers University.

Horrigan, J. B. (2005). On demand citizens: E-government at high speed. Paper presented at the FedWeb Conference at George Mason University.

Jansen, J., de Vries, S. and Van Schaik, P., (2010). The contextual benchmark method: Benchmarking e-government services. Government Information Quarterly, 27(3), 213-219.

Janssen, D. (2003). Mine's bigger than yours: Assessing international e-government benchmarking. Paper presented at the 3rd European Conference on e-Government, MCIL, Reading, MA, 209-218.

Janssen, M. and Wagenaar, R. (2004). An analysis of a shared services centre in e-government. Paper presented at the Proceedings of the 37th Annual Hawaii International Conference on System Sciences, Hawaii. 10.

Janssen, M.; van Veenstra, A. (2005). Stages of growth in e-government: An architectural approach. Electronic journal of e-government.

Jones, S., Irani, Z., and Sharif, A. (2007). E-government evaluation: Reflections on three organisational case studies. Paper presented at the 40th Annual Hawaii International Conference on System Sciences, Hawaii. 105.

Jones, S., Irani, Z., Sharif, A., and Themistocleous, M. (2006). E-government evaluation: Reflections on two organisational studies. Paper presented at the 39th Hawaii International Conference on System Sciences, Hawaii.

Kaisara, G., and Pather, S. (2011). The e-Government evaluation challenge: A South African Batho Pele-aligned service quality approach. Government Information Quarterly, 28(2), 211-221.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2009). Governance matters VIII: Aggregate and individual governance indicators, 1996-2008. Washington: World Bank Institute.

Kaylor, C., Deshazo, R. and Van Eck, D. (2001). Gauging e-government: A report on implementing services among american cities. Government Information Quarterly, 18(4), 293-307.

Klischewski, R., (2003a). Top down or bottom up? How to Establish a Common Ground for Semantic Interoperability within e-Government Communities. In E-Government: Modelling Norms and Concepts as Key Issues, Proceedings of 1st International Workshop on E-Government at ICAIL (pp. 17-26).

Klischewski, R., (2003b). Semantic web for e-government. Electronic government (pp. 288-295) Springer.

Kolsaker, A. and Lee-Kelley, L. (2008). Citizens' attitudes towards e-government and e-governance: a UK study. International Journal of Public Sector Management 21.7, 723–738.

Kourtit, K., Macharis, C., and Nijkamp, P. (2014). A multi-actor multi-criteria analysis of the performance of global cities. Applied Geography, 49, 24-36.

Kujala, S. and Väänänen-Vainio-Mattila, K. (2009). Value of information systems and products: Understanding the users' perspective and values. Journal of Information Technology Theory and Application (JITTA) 9(4): 4.

Kumar, V., Mukerji, B., Butt, I., and Persaud, A. (2007). Factors for successful e-government adoption: A conceptual framework. The Electronic Journal of e-Government, 5(1), 63–76.

Kunstelj, M. and Vintar, M. (2004). Evaluating the progress of e-government development: A critical analysis. Information Polity, 9(3), 131.

Lambrinoudakis, C., Gritzalis, S., Dridi, F., and Pernul, G. (2003). Security requirements for e-government services: A methodological approach for developing a common PKI-based security policy. Computer Communications, 26(16), 1873-1883.

Lanvin, B. and Lewin, A. (2006). The next frontier of E-government: Local governments may hold the keys to global competition. Global Information Technology Report, 2007, 51–63.

Lara, Pablo; Martínez Usero, J.A. (2003). Desarrollo de sitios web para la oferta de servicios característicos de la administración electrónica. El profesional de la información, 2003, mayo-junio, 12(3), 190-199.

Layne, K.; Lee, J. (2001). Developing fully functional E-government: a four stage model. Government Information Quarterly, 18(2), 122-136.

Lee, H., Han, H., Leem, T., and Yigitcanlar, T. (2010). Towards ubiquitous city: Concept, planning, and experiences in the republic of Korea.

Lee, J. (2010). 10 year retrospect on stage models of e-government: A qualitative meta-synthesis. Government Information Quarterly, 27(3), 220-230.

Lee, J. and Lee, H. (2014). Developing and validating a citizen-centric typology for smart city services. Government Information Quarterly.

Lee, S. H., Yigitcanlar, T., Han, J. H., and Leem, Y. T. (2008). Ubiquitous urban infrastructure: Infrastructure planning and development in Korea. Innovation: Management, Policy & Practice, 10(2-3), 282-292.

Lee, S., and Leem, Y. (2006). Understanding U-city. Urban Affairs, 41(1), 36-51.

Lin, F., Fofanah, S. S., and Liang, D. (2011). Assessing citizen adoption of e-government initiatives in gambia: A validation of the technology acceptance model in information systems success. Government Information Quarterly, 28, 271-279.

Löfstedt, U. (2005). E-government–assessment of current research and some proposals for future directions. International Journal of Public Information Systems, 1(1), 39-52.

Löfstedt, U. (2007). E-government services in local governments-a study of development in swedish municipalities. Journal of Organisational Transformation and Social Change, 4(2), 157.

Moonen, T., Clark, G., and Feenan, R. (2013). The business of cities 2013: What do 150 city indexes and benchmarking studies tell us about the urban world in 2013. Jones Lang LaSalle.

Muñoz Cañavate, A. (2005). El web en la administración local española. Conclusiones de seis años de estudio. In: IX Jornadas Españolas de Documentación. Madrid, 2005, p.p. 371-392.

Muñoz Cañavate, A.; Chain Navarro, C. (2004). The World Wide Web as an information system in Spain's Regional Administrations (1997-2000). Government Information Quarterly, 2(2),. 199-218.

Muñoz-Cañavate, A., and Hípola, P. (2011). Electronic administration in spain: From its beginnings to the present. Government Information Quarterly, 28, 74-90.

MV Consultoria (2010). IMUE Libro blanco para la medición del uso efectivo de la administración electrónica MV Consultoria.

Neirotti. (2014) Current trends in Smart City initiatives.

Nguyen, T. T., Sansoni, S., and Le Noir, M. (2003). How e-government are you? e-government in france: State of play and perspectives. US: IBM Business Consulting Services.

NOIE and DMR (2003). E-government Benefits study (Commonwealth of Australia ed.). Camberra (Australia): National Office for the Information Economy.

Noordegraaf, M. (2003). Management by measurement? public management practices amidst ambiguity. Public Administration, 81(4), 853.

Norris, D. F. (2005). E-government at the american grassroots: Future trajectory. In: 38th Annual Hawaii International Conference on System Sciences, 2005. HICSS'05, Hawaii. p. 125b.

Norris, D. F. (2009). E-government among American local governments: Adoption, impacts, barriers and lessons learned. Paper presented at the The International Conference for Administrative Development: Towards Excellence in Public Sector Performance, Riyadh (Saudi Arabia).

Norris, D. F., and Moon, M. J. (2005). Advancing e-government at the grassroots: Tortoise or hare. Public Administration Review, 65(1), 64-75.

Norris, D. F., and Reddick, C. G. (2013). Local e-government in the United States: transformation or incremental change?. Public Administration Review, 73(1), 165-175.

Odendaal, N. (2003). Information and communication technology and local governance: Understanding the difference between cities in developed and emerging economies. Computers, Environment and Urban Systems, 27(6), 585-607.

OECD (2003). The E-government imperative: main findings.

OECD (2007). E-government as a Tool for Transformation. Working Papaer [GOV/PGC(2007)6], background paper for a meeting at de OECD in Paris, 28 March 2007.

OECD (2009). Rethinking e-government services. Organisation for Economic Co-operation and Development. doi:10.1787/9789264059412-en.

OECD (2011). Government at a glance 2011, OECD Publishing.

Ojo, A., Janowski, T., and Estevez, E. (2011). Building theoretical foundations for electronic governance benchmarking. In Electronic Government (pp. 13-25). Springer Berlin Heidelberg.

Olivella, L. (2000). Tecnologies de la informació i modernització de la ciutat. Aula Barcelona.

Panopoulou, E., Tambouris, E. and Tarabanis, K. (2008). A framework for evaluating web sites of public authorities. Paper presented at the Aslib Proceedings: New Information Perspectives, 60(5) 517–546.

Patel, H., and Jacobson, D. (2008). Factors influencing citizen adoption of E-government: A review and critical assessment. Paper presented at the 16th European Conference on Information Systems, Galway (Ireland). 1058-1069.

Peristeras, V., Tsekos, T., and Tarabanis, K. (2002). Analyzing e-government as a paradigm shift. UNTC Occasional Papers Series, 1, 2-14.

Piro, G., Cianci, I., Grieco, L. A., Boggia, G., & Camarda, P. (2014). Information centric services in smart cities. Journal of Systems and Software, 88, 169-188.

Purao, Sandeep, Teo Chin Seng, and Alfred Wu, (2013). Modelling Citizen-Centric Services in Smart Cities. Conceptual Modelling. Springer Berlin Heidelberg. 438-445.

Ragin, C. C. (1994). Constructing Social Research. Pine Forge Press.

Ragin, C. C. (2013). New directions in the logic of social inquiry. Political Research Quarterly, 171-174.

REGIONAL-IST (2003). E-government and e-business indicators: Selection of key indicators in accordance with eEurope.

Richard, R. (1997). Cities for a small planet. UK Faber and Faber Limited, UK, 114-122.

Rodriguez, J.R., Batlle, J. and Esteban, D. (2007a). E-government city models: Cases from European cities. Barcelona: Ajuntament de Barcelona. ISBN: 978-84-9850-028-8

Rodriguez, J.R., Batlle, J. and Esteban, D. (2007b) European Study of E-government City Models. *Internet*, *Law* and Politics Journal IDP. 2007 no 5.

Rogers, R. (1997). Cities for a small planet. UK Faber and Faber Limited, UK.

Rogers, Y. (2011). Interaction design gone wild: striving for wild theory, Interactions 18(4), 58-62.

Ronaghan, S. A. (2002). Benchmarking E-government: A global perspective. United Nations. Division for Public Economics and Public Administration.

Rorissa, A., Demissie, D., and Pardo, T. (2011). Benchmarking e-government: A comparison of frameworks for computing e-government index and ranking. Government Information Quarterly, 28(3), 354-362.

Ruiz, I. J. M. (2013). Large-scale empirical studies of mobile apps (Doctoral dissertation, Queen's University).

Sakowicz, M. (2003). How to evaluate E-government? different methodologies and methodes. Paper presented at the Eleventh NISPAcee Annual Conference,

Salem, F. (2007). Benchmarking the e-government bulldozer: beyond measuring the tread marks. Measuring business excellence, 11(4), 9-22.

Sancho, D.(2007). Estrategias de evaluación de iniciativas de administración electrónica. Administración & cidadanía, 2(3), 199.

Schellong, A. (2009) EU eGovernment Benchmarking 2010+: General remarks on the future of benchmarking Digital Government in the EU.

Schellong, A. (2010). EU eGovernment benchmarking 2010+. Cambridge, MA: Institute for Quantitative Social Science. Harvard University.

Shackleton, P., Fisher, J. and Dawson, L. (2004). Evolution of local government E-services: The applicability of e-business maturity models. Paper presented at the 37th Annual Hawaii International Conference on System Sciences, 5-8.

Shareef, M.A., Kumar, V., Kumar, U. and Dwivedi, Y.K. (2011). e-government adoption model (GAM): Differing service maturity levels. Government Information Quarterly, 28, 17-35.

Sharma, C. (2010). Sizing up the global mobile apps market. Report, Chetan Sharma Consulting, Issaquah, WA.

SIEMENS AG. (2010). ICT for city management (No. L2-Z501-x-7600). Singapore: SIEMENS AG.

Siskos, E., Askounis, D. and Psarras, J.(2014). Multicriteria decision support for global e-government evaluation. Omega, 46, 51–63.

Snellen, I. T. M.; van de Donk, W. B. H. J.(1998). Public administration in an information age: a handbook. Amsterdam: Ios Press.

Tambouris, E., Gorilas, S., Kavadias, G., Apostolou, D., Abecker, A., Stojanovic, L., et al. (2004). Ontology-enabled e-gov service configuration: An overview of the OntoGov project. Knowledge Management in Electronic Government, 122-127.

UN (2010). E-government survey 2010. Leveraging e-government at a time of financial and economic crisis No. ST/ESA/PAD/SER.E/131. New York: United Nations.

UN (2013). E-government survey 2012. E-Government for the People.

UN (2014). E-government survey 2014. E-Government for the Future We Want. ST/ESA/PAD/SER.E/188. New York. United Nations 2014.

Valdés, G., Solar, M., Astudillo, H., Iribarren, M., Concha, G., and Visconti, M. (2011). Conception, development and implementation of an e-government maturity model in public agencies. Government Information Quarterly, 28, 176-187.

Vassilakis, C., and Lepouras, G. (2006). An ontology for e-government public services. Encyclopedia of E-Commerce, E-Government and Mobile Commerce, , 865–870.

Warkentin, M., Gefen, D., Pavlou, P. A., and Rose, G. M. (2002). Encouraging citizen adoption of e-government by building trust. Electronic Markets, 12(3), 157-162.

Wescott, C. G. (2001). E-government in the Asia-Pacific region. Asian Journal of Political Science, 2001, 9(2), 1-24.

Whitmore, A. (2012). A statistical analysis of the construction of the united nations E-government development index. Government Information Quarterly, 29(1), 68-75.

Wohlers, T. E. (2007). E-government: Trends and sophistication at the local level of government. In: Annual Meeting of the Midwest Political Science Association, Palmer House Hotel, Chicago, IL.

Yigitcanlar, T. (2010). Urban management revolution: Intelligent management systems for ubiquitous cities.

Appendix 1: Artefacts of the pilot survey

This appendix provides examples of the forms used in the Bench-learning pilot measurement to gather data, and the instructions given to fill them[7].

Services Description form (example for the Employment and Business area)

This form is used to identify the main characteristics of the services provided by the different cities. It was used to build the catalogue of services. At the same time, it helped to identify equivalent services.

FORM

Employment and Business	
Recruitment (for jobs in private sector)	
• Is there a job-search service promoted by the city?	
• Can users apply for a job offer online?	
• Is this service integrated to other employment services?	
Public tenders (for jobs in public sector)	
• Is there a job-search service promoted by the city?	
• Can users apply for a job offer online?	
• Is this service integrated to other employment offers?	
Portal for companies	
• Is there a specific portal for companies?	
• Which type of information is contained in the folder? (taxes, fees, procedures…)	
• Is this an end-to-end service? (can the procedures be fully performed online)	
• Are there notifications available? (for credits, education programmes, public tenders…) Through which channels?	
• Is this service integrated with other public administrations? (national/federal trade register, business chamber…)	
Portal for entrepreneurs	

7 The complete version of the form can be found at http://citygovernance.wordpress.com/publications/

• Is there a specific portal for entrepreneurs?	
• Can business be registered online?	
• Which type of information is contained in the folder? (taxes, fees, procedures…)	
• Is this service integrated with other public administrations? (national/federal trade register, business chamber…)	
• Are there notifications available? (for credits, education programmes, public tenders…) Through which channels?	
• Is this an end-to-end service? (can the procedures be fully performed online)	
Is there any other service in this area that you would like to remark?	

Maturity and adoption form (example for the Education category)

Basic form to collect information about e-service provision, maturity and adoption.

FORM

Education	Provision of the service (YES/NO)	Maturity Level (1 to 5)	Adoption Level (1 to 5)	Comments
Pre-school children education				
Children education				
Adult education				
Cooperation home-school				
Libraries				
Cultural heritage sites				
Funds for cultural projects				
Media workshops				
Summer camps				
Oral history preservation				
(Please feel free to add as many services as you consider)				

City competences form (example with some services)

This form was circulated to clarify the role of cities in case of having no competences on a specific service.

FORM

For those services that your city has no competence, please detail which kind of information the city offers related with this service.

Services in which the city lacks of competence						
Services	Category	Is a city competence ? (Yes/No)	For those services out of city's competence, does the municipality offer any kind of information online?			
			Plain information	Link	Downloadable forms	Other (interoperability, etc.)
Example Service	Example Category	Yes				
Example Service	Example Category	No	X	X		
City's homepage	Channelling					
Citizens personal folders	Channelling					
Consultation online	Channelling					
Bulletin/Newsletter	Channelling					
...	...					
City council plenary sessions access	Citizens' Engagement					
Participation processes	Citizens' Engagement					
City council listens	Citizens' Engagement					
City archives consultation	Citizens' Engagement					
...	...					
Pre-school children education	Education					
Children education	Education					
Adult education	Education					
Cooperation home-school	Education					

Libraries	Education					
...	...					

Maturity and Adoption form instructions

These instructions were circulated accompanying the form where each city was requested to detail maturity and adoption marks for each of the service provided.

SERVICES' CATALOGUE

The information below should help you best define which are the different services taken into consideration in this new template. All the services have been divided in 9 main categories, listed as follows:

CHANNELING

- City's homepage: main website of the municipality.
- Citizens' personal folders: personalized useful information for citizens. Information included in the folders may vary from one municipality to another. Some examples of information would be: fiscal information, online payments, access to paid tributes, etc.
- Consultation online (email, chat, phone…): tool to make request on any service or information concerning the City Hall and its services. This consultation can be made through several channels. According to the channel chosen the answer can be immediate (chat or phone). There may be a service level agreement in terms of providing an answer to the citizen.
- Bulletin/Newsletter: bulletin delivered online to the citizenship containing any kind of service or activity of general interest. The service may be available under subscription. The citizen may choose the contents he/she wants to receive.
- GIS and virtual flight: GIS stands for Geographic Information Systems, that is, a service that provides information regarding maps from the city. The municipality may provide information integrated with a GIS map, for instance, hospitals exact situation, schools around a user house, etc.
- Customized web pages: possibility to customize any municipal website according to citizens' interests (Web 2.0 concept). This concept could be very wide. Some examples of web-page's customization: possibility to change the font size of the web-page, possibility to choose which information is shown in the main website according to the user (through the use of cookies), etc.
- Procedures information with other PA (local, regional and national): information about procedures with other public administrations shown in the municipality's website.

CITIZENS ENGAGEMENT

- City council plenary sessions access: service that offers the possibility to follow the meetings of the city council live on the website. It may also include the possibility to consult communal and municipal decision, read documents and view political

issues debated within the City Council. It may include information regarding presentation/availability of all political members.

- Participation processes: use of classical as well as electronic / telematic / multichannel tools in a collaborative path to the development of new forms of e-participation. It may include development of areas devoted to online studies, questionnaires, projects and online forums.
- City council listens: online service to make complaints and notifications through the digital desk. The citizen may, for example, file a complaint or make a notification about the environment, the illegal construction of a building, etc. There may be a service level agreement in terms of providing an answer to the citizen.
- City archives consultation: Digitization of the city's archives that can be accessible to the citizens in the archive homepage. Citizens may request to view an archive (previously browsed through the content list) by filling a form obtainable in the reading hall of the archive building or online in the archives' homepage.
- Second Life Island: inclusion of the municipality's desk (front office) in Second Life.
- Reservation for municipal buildings: a citizen wishing to reserve a municipal building for any special event may visit the municipal website and contact the service in charge of reservations. This service may be charged.
- Lost and found online service: service through which a citizen may submit for a lost thing. The qualified officer will contact him/her for more information and/or to give back the object.
- Kiosks: Automatic machines through which any resident may access city council information such as e-services or send emails for free. The service may include also an option to purchase tickets for any event that takes place in the city. The kiosks may be located in public areas such as libraries, municipal buildings, etc.

EDUCATION

- Pre-school children education: online service that may include information about pre-school's inscription, possibility to perform and pay the inscription online, etc. The service may request any kind of identification from the user.
- Children education: online service that may include information about school's inscription, possibility to perform and pay the inscription online, etc. The service may request any kind of identification from the user.
- Adult education: online service that may include information about adult courses and activities, possibility to perform and pay the inscription online, etc. The service may request any kind of identification from the user.
- Cooperation home-school: online space for parents, teachers and students to exchange information about school evolution (homework, activities, exams, etc.) The service may request for any kind of secure identification from the users.
- Libraries: an integrated online database containing information of any public library's material, that is, an integrated catalogue of public libraries The citizen would only have to make a unique search to find a book/cd/dvd/magazine and would have the chance to reserved it online or even extend loan periods.

- Cultural heritage sites: online information and booking to certain museums (municipal or not) or cultural sites and activities.
- Funds for cultural projects available online: possibility to find information and apply online for any kind of fund for cultural projects.
- Media workshop: service offered in the neighbourhoods of the municipality. The city may sustain initiatives from citizens building media-projects about their own neighbourhood. The you-tube applications may be improved by influx of quality: scriptwriting and image building.
- Summer camps or similar: online service regarding information about summer camps for kids or teenagers. The service may include the possibility to make an inscription, to make the payment online, etc.
- Oral history preservation: online site where citizen may exchange information about the past of the city. For example, a user may upload an old picture and other users may make comments on it. This service may be available under subscription.

EMPLOYMENT & BUSINESS

- Recruitment (jobs in private sector): job-search utility promoted by the city. Users would apply for a job online. The service could also be integrated with other employment services from the city or from other public administrations.
- Public Tenders (jobs in public sector): job-search utility to inform about open or yet to open public tenders.
- Portal for companies: specific website for companies containing information on: taxes, fees, procedures, etc. Procedures could be fully performed online. There would also be a notification service for credits, education programmes, public tenders, etc.
- Portal for entrepreneurs: specific website for new companies. Procedures could be fully performed online, including business registration. There would also be a notification service for credits, education programmes, public tenders, etc.
- online Business registration: service to perform a registration for any type of commercial enterprise completely online. This service may also include the option to make any payment online.

ENVIRONMENT

- Recycling parks: information available online regarding recycling parks' areas and times of collection and any other useful information. The service may also be integrated with a GIS map and may require identification.
- Public property maintenance (streets, roads, public buildings…): online service to report a damage on a public property (graffiti, potholes…). Citizen could request feedback notification. A service level agreement in terms of providing an answer to the citizen may also be stated.
- Bulky waste collection: areas and times of collection available online. Citizens would have the option to request collection in their neighbourhoods.
- Web flea markets: online service through which the citizen can upload a product he/she wants to sell or give away including pictures, characteristics and any other useful information. Other users may contact him/her to buy the product if they are interested. The service may be offered upon registration.

LIFECYCLE

- Personal certificates (birth, marriage, death...): possibility to request any kind of personal certificate online. The service may include any payment that should also be performed online.
- Population registry (census): possibility to register in the census online. This information may be used as the official address through which the communication citizen-municipality shall be done. The city council may provide the user with a confirmation either online or not.
- Residence registration (change of address): possibility to register an address' change online, that is, change of an official citizen address when he/she moves from one house to another. This information may be used as the official address through which the communication citizen-municipality shall be done, including the official voting address. The city council may provide the user with a confirmation either online or not.
- Digital documents management system (request of extracts, copies…): service offered online by the city council through which the user may request any document regarding life-cycle he needs. If the service requires any payment, this may also be performed completely online.
- online fines consultation and payment: online service that would offer the possibility to consult and pay any type of fine mounted up by the citizen.
- online vehicles registration: service that would allow a citizen to register his/her vehicle online. If the service requires any payment, this may also be performed completely online.
- online taxes and fees payment: online service that would offer the possibility to consult any tax or fee status and pay it.

SOCIAL CARE

- Housing for people with low incomes or under threat of homelessness: service through which people with economic hardships may apply for any housing help in terms of economic funding or providing a provisional accommodation itself.
- Monitoring children during holiday seasons, before and after school: tool that parents can use to look after their kids any time they cannot be taking care of them. The tool may include monitoring during holiday seasons and before and/or after school activities, that is, the possibility to let the citizen directly enter the requests for playing squares and the monitoring before and/or after school hours
- Disabled parking permits: online service through which disabled people can request a parking license that will allow them leave their car in the restricted areas.
- Physicians database: an open catalogue where any user may find the address of any medical doctor in the city. The service may be integrated with a GIS map.
- Discounts for people with low incomes: service through which any resident with economic hardships may receive help from their municipality in form of discounts for any activity, service, etc.
- Birthday benefits: online service through which kids under a certain age may receive a present (economic or not) from their municipality. This service may be

oriented to large families only or families with economic hardships. Bank account number or other information may be required under identification.
- Childbirth allowances: online service through which the new parents may request an economic benefit payed in case of birth by the municipality. Bank account number or other information may be required under identification.
- Permits for organizing public events: online service through which civil servants receive applications from citizens, claim accordance and issue permits for arranging public events.
- Individual and family care service aid-calculation: service related to the municipality's social work that may include special aids for those families or individuals with special needs, economic or not.
- Health services offered to elderly people through domotics: any kind of domotics tool used to reinforce the care of old people's health. The service may be upon request and may require some type of registration.
- E-monitoring of health status of elderly people through domotics: tool used to alert the care centre through electronic means in case, when monitoring elderly people health, certain parameters are exceeded or in case an active or passive alarm goes off.
- Ambulatory care coordination through PDA: provision of PDA to all nurses so that time-consuming tasks like prescriptions or health reports become shorter. This service may help enhancing effectiveness and efficiency of the medical professionals that have to move to the patient's houses.

TRANSPORT
- Public transport services: online service regarding information about public transport in general and more specifically: journey-planners, virtual tickets acquisition, etc.
- Car parking: online service that may include information about municipal car parking areas and/or online acquisition of electronic parking vouchers.
- Municipal bicycles lending: online service under subscription that would allow the citizen use any municipal bicycle. These bicycles would be placed in several pick-up areas around the city.

URBAN PLANNING
- Construction permits: online service that may include the possibility to ask for a construction permit through the Internet. If payment should be done, this also may be performed completely online.
- Land-use plans and building regulation: online public information regarding actual and future land-use plans and cadastral regulation. The service may be integrated with a GIS map.
- Certificates (cadastral information, taxation, mortgage statements…): online service that would let the user ask for any urban certificate online. The certificate may be sent electronically or at the requester's house. If payment should be done, this also may be performed completely online.
- Acquisition of land by foreigners: online information for immigrants on how to obtain a property. The purpose of this application may be to allow foreigners

wishing to buy real estate or an apartment in the city to apply for the required approval via the internet. This could be done by a local lawyer or notary public.

NOT INCLUDED SERVICES

We are aware that there might be hundreds of interesting initiatives done by the participant cities that we have maybe disregarded and that they might be worth expounding. Should the city would like to include any other service not commented before, please feel free to add as much rows in the template as necessary. The project and final report's quality will considerably increase with all the involved cities devoted participation.

MATURITY LEVELS

As commonly agreed, the measurement of the service maturity will be based on the previous work made by Baum & Di Maio in the "Gartner Four Phases of eGovernment Model" in 2000. Eight years after, we are prepared to extend the range of maturity to include a new fifth level on the top to reflect a more advanced degree based on the introduction of citizen's participation and discussion processes of public policies. Then, our measurement framework is based upon a method that has been modernized to take into account new technological possibilities and insights. Therefore, the model for maturity service measurement will be based on 5 levels as follows:

1. Information level: Ability to offer relevant information in a one basic provision process, usually website based, that is, the user will only be able to receive information and not to download any kind of form or give any kind of feedback.
2. Interactivity level: Users can generate basic content (email, template, queries) which is introduced in the government databases. It is also a one-way interaction process in which the user can, for instance, download forms online. However, to give them back the user has to go personally to any of the municipal attention offices.
3. Transaction level: Transactions (payments, certificates, etc.) can be completed throughout an electronic channel. Therefore, this is a two-way interaction with the user in which not only the forms can be downloaded online but also sent back online. The achievement of this level implies the possibility to completely perform a service online through the use of ICT.
4. Transformation level: level achieved once the transaction level 3 is completed and the whole service's process starts being rethink in order to make a deep improvement. This improvement would certainly imply a Business Process Re-engineering in the municipality's back office, that is, an internal change in order to integrate as much user's information as possible. On the other hand, it would also imply a significant change in the service's provision in the front office so that its delivery would suffer a complete carefully thought change in the eyes of users.

5. Participation level: This level implies the first steps of the achievement of the Web 2.0 concept, that is, to let and promote citizens participation in all e-services so that user's opinions are taken into account to enhance quality and effectiveness and that they receive some sort of feedback for those contributions. This 5th level provides an indication of the extent to which online provision is based on new models to use available information obtained from the citizenship. This level reaches a high degree of pro-activeness in services' delivery. For instance, opinion from a specific user should be required in a certain service so that it could be helpful for other users in the future, allowing a user-view of the process.

Maturity Levels Example: let's take into consideration, for instance, the cultural agenda of the city's website.

- If only information on everyday events is found we would mark it as level 1 Information.
- If the user can subscribe to any bulletin online we would mark it as level 2 Interactivity
- If tickets could be bought and printed completely online we would mark it as level 3 Transaction.
- If in the case of buying a ticket for a specific event, our personal information is remembered by the system so that we only have to provide an ID or an e-mail address (along with a password or not) we would mark the service as level 4 Transformation.
- If we could make comments on any event along with other users and see other user's contributions we would mark it as level 5 Participation.

ADOPTION LEVELS

It is of great interest in our bench-learning exercise to include an adoption measurement tool. Obviously, no matter how original a new service is if it is not wide accepted among the citizens it doesn't provide any benefit neither to the city nor to our project. In that sense, we propose a simple 5-stages measurement table to be able to "quantify" which is the level of adoption for any of the different services under study.

1. No adoption. The service has been a complete failure and the municipality is considering its withdrawal.
2. Low adoption. The service us being used by less citizens than previously accepted.
3. Medium adoption. The service is being used by the average of citizens expected.
4. High Adoption. The service is being widely used among citizenship.
5. Excellent adoption. The service has been a complete success and the municipality is devoting more HR and investment on it.

The final adoption grade that every service may achieve will be based not only in the percentage of citizens using the service but also in the target group it is focused on. The

different particularities of each country's population shall be taken into account, that is, for example, when talking about e-services penetration among elderly people, the scene will not be the same in Spain or in Sweden. Whereas a number of 1000 elderly people using Internet to make a doctor's appointment would be excellent adoption in Spain, it won't surely deserve the same mark in Sweden.

FINAL COMMENTS

Europe and its citizens are not uniform and, therefore, large cities won't provide the same equal service anywhere. In this section every city will have the opportunity to make comments about any service's special particularity that they consider it is worth explaining. Among other remarks, the following information is also expected to be included:

- Why the service has finally achieved the maturity level stated in the table?
- How has adoption been measured in this case?
- If the service is not provided, why? Who provides it then?

Appendix 2: European Study of e-Government City Models. Interview questions

As part of the European Study of e-Government City Models the following people in charge of e-government strategy in the 7 cities of the study were interviewed:

- the Deputy Managing Director of the city of Barcelona Mr. José Ramón Rodriguez
- the CIO of Birmingham MrGlyn Evans
- the e-government programme coordinator of Munich Dr. Hannelore Schenll
- the IT manager of Stockholm Mr. Johan Särquist
- the CEO of personal, organization and IT of The Hague Ms Petra Delsing
- the Manager of real state, companies and ICT of the city of Turin Mr Sandro Golzio
- the CIO of Vienna Mr Johann Mittheisz

The interviews were performed following the interview script that can be find below. It was circulated in advance among the interviewees.

All the participants were interviewed by phone with the exception of the Deputy Managing Director of the city of Barcelona that was interviewed face-to-face.

Each interview transcription was submitted to the approval of the interviewee. Once approved, the interview transcriptions were published in Rodriguez, Batlle & Esteban (2007a).

Interview script:

1. E-government strategy
    1. What's the current strategy of your city as far as e-government is concerned?
    2. How is the evolution on e-government perceived from the city perspective?
2. The e-government model
    1. What would you think is the most appropriate description of the e-government city model in your city?
3. Phases of the e-government deployment
    1. Which are the key constituency-building phases for the existing e-government in your city?
4. Key Stakeholders

1. Which were the key stakeholders that enabled the business transformation process?

5. Barriers
    1. Which are the main barriers you faced in the development of your e-government city model?
6. Benefits and risks
    1. Which are the benefits of having this e-government city model?
    2. Which are the risks of not having an e-government city model?
    3. Which are the most important assets created in this process?
    4. What is still missing in your model?
7. Killer services
    1. Which are the killer services?
8. Importance of multi-channel and multi-modality
    1. Which is the impact of multi-channel and multi-modal dimension?
9. Transferability to other cities
    1. How transferable is the experience of your city to other cities?
10. Future challenges
    1. Which are the key challenges for the coming years?

Appendix 3: Questionnaire of the impact survey

Q1: Did your city participate in the Local e-Government Bench-learning survey? (Answer: Yes / No / I don't know). Please, write the name of your city

Q2: *What did you or your organization learn from the results of the Local e-Government Bench-learning survey?* (Answer: Yes / No / I don't know)

- The position of your city against competitors
- Cities with a similar profile to share experiences
- The extent of the catalogue of services that cities are offering
- New services that can be offered to citizens
- New functionalities or richer interaction levels
- Categories in which the city is underperforming
- The importance of measuring the adoption of e-services
- Good practices to learn from

Q3: *Please, mark which aspects of your city e-Government have benefited from the city maps offered by the Local e-Government Bench-learning report* (Answer: Yes / No / I don't know)

- Understanding the global position of your city
- Visualizing how mature and coherent is the e-service offer
- Identifying strengths and weaknesses in e-service
- Better planning the next improvements in e-service offer
- Others (please, specify)

Q4: *Please, mark in which areas or service categories the good practice list resulting from the Local e-Government Bench-learning has been useful for your city to identify initiatives to learn from* (Answer: Very useful / Quite useful / Useful / Slightly useful / Not useful at all)

- Channelling
- Citizens' Engagement
- Education
- Employment & Business
- Environment
- Life cycle
- Social Care
- Transport and mobility
- Urban Planning

Q5: *Please, mark in which areas or service categories your city started, or plan to start, any action to improve the e-services offer as a consequence of the Local e-Government Bench-learning results* (Answer: Yes / No / I don't know)

- Channelling

- Citizens' Engagement
- Education
- Employment & Business
- Environment
- Life cycle
- Social Care
- Transport and mobility
- Urban Planning

Q6: *Is self-evaluation a good method to assess the service provision, maturity of e-services and the citizens' adoption?* (Answer: Yes / No). If the answer is (No), provide suggestions to improve the evaluation method

- Service provision
- Maturity
- Adoption

Q7: *Which are the metrics to measure citizens' use of e-services that your organization is using?* (Answer: Yes / No / I don't know)

- Number of web visits or session
- Number of forms downloaded
- Number of forms submitted
- Number of transactions

Q8: *Please, mark which areas of the Local e-Government Bench-learning methodology need to be improved* (Answers: It's OK / Needs some adjustments / Needs to be re-designed)

- Catalog of services
- Service categories
- Matrix of service coverage
- Evaluation method
- e-Government maturity model
- Scale for adoption
- Global maps
- City maps
- List of good practices
- Other (please, specify

Q9: *How often does your city participate in e-government benchmarking surveys?* (Answers: Never / Sometimes / Once a year I don't know)

- Regional level
- State level
- European level
- Worldwide

Q10: *Could your city be interested in participating in a new edition of the Local e-Government Bench-learning survey at European level?* (Answers: Yes / No / I don't know)